

Please note that this English version of the study and examination regulations is nothing more than an aid to orientation. Solely the German version is legally binding.

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LIST OF CONTENTS

Study and Examination regulations of of the Faculty of Mathematics and Informatics of the Free University of Berlin for the Bachelor's degree course Informatics for Teacher Training, for the module offering 60 credit points in informatics as adjuncts to other courses of study	1056
Study and Examination regulations of of the Faculty of Mathematics and Informatics of the Free University of Berlin for the Bachelor's degree course Mathematics for Teacher Training, for the module offering 60 credit points in mathematics as adjuncts to other courses of study	1075

Study and Examination regulations of the Faculty of Mathematics and Informatics of the Free University of Berlin for the Bachelor's degree course Informatics for Teacher Training, for the module offering 60 credit points in informatics as adjuncts to other courses of study

Preamble

On the basis of § 14 Par. 1 No. 2 of the Partial Basic Regulations (Trial Model) of the Freie Universität Berlin of 27 October 1998 (FU Announcements No. 24/1998), the Department Council of the Faculty of Mathematics and Informatics of Freie Universität Berlin on May 13 2015 issued the following Study and Examination Regulations for the Bachelor's Degree Course in Informatics for Teacher Training of the Faculties of Mathematics and Informatics of the Free University of Berlin for the module offering 60 credit points in informatics as adjuncts to other courses of study:*

I. General section

- § 1 Scope
- § 2 Student advisory and course advisory service
- § 3 Examination Committee
- § 4 Forms of teaching and learning
- § 5 Repetition of examinations
- § 6 Electronic examinations
- § 7 Submission format of written examination work

II. Special section

1. Section: Bachelor's degree course Informatics for Teacher Training

- § 8 Qualification objectives
- § 9 Study contents
- § 10 Standard Study Period
- § 11 Structure and outline; scope of performance
- § 12 Field of study teacher training studies for incorporated secondary schools and grammar schools (LBW-ISS-GYM)
- § 13 Bachelor's Thesis
- § 14 Studies abroad
- § 15 Graduation

2. Section: Module offering 60 credit points in informatics as adjuncts to other courses of study

- § 16 Admission requirements
- § 17 Qualification objectives

* This regulation was confirmed by the Executive Board of the Freie Universität Berlin on 11 June 2015.

§ 18 Study contents

§ 19 Structure and outline; scope of performance

III. Final provisions

§ 20 Entry into force and transitional regulation

Annexes

Annex 1: Module descriptions

Annex 2: Examples of courses of study

2.1 Example of course of studies for the Bachelor's degree course Informatics for Teacher Training

2.2 Example of course offering 60 credit points in informatics as adjuncts to other courses of study

Annex 3: Report of Grades (sample)

Annex 4: Diploma (sample)

I. General section

§ 1 Scope

These regulations stipulate the objective, contents and structure of the Bachelor's degree program in Informatics for Teacher Training of the Faculties of Mathematics and Informatics of the Free University of Berlin for the module offering 60 credit points in informatics as adjuncts to other courses of study (module offering with 60 credit points), and in supplementation to the framework study and examination regulations of the Free University of Berlin (RSPO), requirements and procedures for examination performances (credit points) in the Bachelor's course of studies and the module offering with 60 credit points.

§ 2

Academic Subject Advising and Academic Advising

(1) The general student advisory service is provided by the Central Student Advisory and Psychological Advisory Office of the Freie Universität Berlin.

(2) Academic subject advising is done by professors who provide such events during regular consultation hours. It is also recommended that the suitability of planning an individual course schedule should be discussed with the course coordinator.

The Faculty also offers a student advisory service for female students; in such cases the contact is the women's representative of the Faculty of Mathematics and Informatics of Freie Universität Berlin.

§ 3

Examining Board

The examining board set up by the Faculty of Mathematics and Informatics at Freie Universität Berlin for the bachelor's degree program and the module offering 60 CP is responsible for organizing examinations and for the other tasks stated as part of the RSPO.

§ 4

Forms of teaching and learning

The following forms of teaching and learning are offered at Freie Universität Berlin as part of courses on offer:

1. Lecture (L): Lectures either provide an overview of the wider scope of a subject, as well as its methodological or theoretical fundamentals in a specific subject area and its research issues, therefore acting as an illustration of overall contexts and theoretical bases. The most typical teaching format is a lecture from the relevant instructor, but other interactions and joint exercise aspects also feature.
2. Exercise (E): Exercises take place in small groups as an accompaniment to lectures, where these groups should not contain more than twenty participants. The exercises are carried out by student assistants, or research assistants under the supervision of the instructor for the relevant lecture. Exercise sheets with tasks appear at regular intervals regarding a lecture, and these should be done by students independently as homework or in small groups that are organized by the students themselves. The solutions, or approaches to solving the problems, are stated in workgroups and then discussed. The purpose of workgroups is to deepen knowledge of the material covered in the lecture, as well as learning and practicing methods and techniques. In addition, the discussion should cover informatics, collaboration, and planning own work processes.
3. Seminar on PC (SPC) During on-campus time these are used to impart knowledge of a distinct subject area and to acquire skills, independently answer a question, illustrate the results and to discuss these critically. The major type of work is working together on a PC whilst using special software.

(2) The forms of teaching and learning in line with Par. 1 can be used in blended learning arrangements. The on-campus studies are linked with electronic media such as Internet-based media (e-learning). In this case, selected teaching and learning activities are offered via e-learning applications and either carried out by students independently on their own or in a group, and/or with other support.

§ 5

Repetition of examinations

(1) Examination work can be repeated three times, and the Bachelor's thesis can be repeated once if these

are not originally passed.

(2) If the first potential examination date is directly after the end of the associated course then an examination performance graded as "sufficient" (4.0) or better in the module may be repeated once for the purpose of improving a grade, which takes place by the beginning of the subsequent semester at the very latest. The better grade will be taken into account. An improvement in the grade is not possible in case of a repeated exam.

§ 6

Electronic examinations

(1) In the case of electronic examinations, performance and evaluation is carried out with digital technologies.

(2) Before an examination where digital technologies are used, the suitability of such technologies with regard to the intended examination tasks, and performance of the electronic examination, should be verified beforehand by two examiners.

(3) The authenticity of the author and the integrity of examination results should be safeguarded. The examination results, in the form of electronic data, are clearly identified to this effect and also unmistakably and permanently assigned to the student. It should be ensured that electronic data remains unchanged and complete for assessment and for verifiability.

(4) An automatically generated assessment of examination performance should be checked by an examiner if requested by the student in question.

§ 7

Submission format of written examination work

Written examination work that is not in the form of a written exam should also be submitted in electronic form in portable document format (PDF). The files in PDF format should have machine-readable text and not just contain charts; furthermore there should be no rights restrictions. Systems, such as computer programs in particular, should be submitted in the source text. § 14 par. 3 phrase 7 and 8 of RSPO therefore apply.

II. Special section

1. Section: Bachelor's degree course Informatics for Teacher Training

§ 8 Qualification objectives:

(1) Graduates of the Bachelor's degree program are aware of the spectrum of essential basic terminology in informatics and methods from fundamental areas in informatics (theoretical, technical, practical, and applied informatics), as well as phenomena of socio-technical systems. They can expand or update this knowledge and these skills independently if necessary and make themselves aware of the state of the art regarding the topic at hand. They are able to analyze an informatics-related issue of either simple or moderate complexity, or to approximately model it using appropriate means whilst also being able to express themselves either in a manner that is appropriate for informatics experts or for those within the application at hand. They can construct, implement, document, and test a moderately complex software system on their own or in a team. At the same time, they can also take on parts of larger projects in a team in order to independently carry out sub-tasks, recording the results of others and also to pass on their own results. They are able to assess the socio-technical effects of computer systems. They can critically evaluate and act responsibly. With the aid of these fundamentals and techniques, they can analyze and understand new problems in informatics and independently acquire skills that are missing.

(2) They can also apply and explain informatics thinking even in non-technical environments. They can acquaint themselves with new applications and technologies. They can critically evaluate and act responsibly. They are capable of reflective and constructive handling of gender and diversity aspects whilst also being able to work responsibly in a team with sensitivity in such areas.

(3) Graduates of the Bachelor's degree course are qualified for further Master's degree programs, particularly those that are related to teaching. They can also specialize in other Master's degree programs alongside fields of work that have more of an educational focus. In addition, they may also acquire skills across disciplines, such as in the fields of science journalism and publishing, "Public Understanding of Science" and public relations work that focuses on the preparation and dissemination of scientific content. Particular importance is given to the ability to adapt to changing fields of activity, to adapt to the changing conditions within the practice of processing information, and also to take an active part in this transformation. They can work in functions that focus on the design, development, or operation of computer systems, or such functions that otherwise benefit from the versatile informatics approach to thinking complete with modeling, abstraction, systematization, or

algorithmization.

§ 9 Study contents

(1) In the Bachelor's degree course software systems and their requirements are analyzed and formalized based on mathematical and informatics theories and methods. Techniques of designing and realizing new software systems are learned; this also applies to methods of quality assurance. Fundamental methods for programming computers are learned in Algorithms and Programming. The fundamental characteristics of computer systems are examined in technical informatics; students learn how to understand computers as devices with an interface for software development, such as a machine language, an operating system, or a network protocol. The fundamental options and limits of calculating are learned in theoretical informatics as well as techniques for estimating the inherent effort of specific algorithmic processes. Technologies with a view of their use are covered in practical informatics. Fundamental uses of language and methods of formal discourse regarding software are learned and practiced in Mathematics for Informatics.

(2) Students acquire individual skills as part of the course, including the educational components that beneficially enhance informatics expertise for work within this sector, or they acquire fundamental knowledge in an application within informatics which enables them to easily work together with specialists in this field to discover solutions to informatics-related application problems within the sector under specific technical, economic, and social conditions.

§ 10 Standard Study Period

The standard study period is six semesters.

§ 11 Structure and outline; scope of performance

(1) A total of 180 credit points (CP) must be earned in the Bachelor's degree program. The Bachelor's degree course comprises

1. the core subject, encompassing 90 credit points, consisting of a mandatory part comprising 65 CP, an elective part comprising 15 CP and the Bachelor's thesis comprising 10 CP.
2. a module offering 60 CP from other teacher-training areas,
3. field of study teacher training studies for incorporated secondary schools and grammar schools (LBW-ISS-

GYM) with a scope of 30 CP.

(2) Modules with a scope of 65 CP should be completed as follows in the mandatory part of the core subject.

a) The following modules must be completed:

- Module: Functional Programming (9 CP),
- Module: Object-oriented Programming (8 CP),
- Module: Logic and Discrete Mathematics for Teacher Training (10 CP),
- Module: Fundamentals of Theoretical Computer Science (7 CP),
- Module: Algorithms, data structures, and data abstraction (9 CP),
- Module: Database systems (7 CP), and
- Module: Software technology (10 CP).

b) In addition, one of the following two modules should be chosen and completed:

- Module: Computer architecture (5 CP), or
- Module: Operating and Communication Systems (5 CP).

(3) In the elective part of the core subject, modules comprising 15 CP should be chosen and completed, of which at least one module should feature a module exam that is evaluated separately. The following modules are offered:

- Module: System management (5 CP),
- Module: Occupational informatics internship (10 CP),
- Module: Software project A (10 CP),
- Module: Software project B (10 CP),
- Module: Non-sequential and distributed programming for teacher training (10 CP),
- Module: Effects of informatics (5 CP),
- Module: Social aspects of Practical Computer Science (5 CP),
- Module: Fundamentals of Technical Computer Science (10 CP),
- Module: Research internship (5 CP)
- Module: Scientific work within informatics (5 CP),
- Module: Operating and Communication Systems (5 CP) or module: Computer architecture (5 CP), provided that it was not already selected and completed as part of the mandatory topic as per Par. 2, letter b).

In addition, modules can be selected from the master's degree program in informatics from the Faculty of Mathematics and Informatics of Freie Universität Berlin as individual advanced modules.

(4) Students taking the mathematics module worth 60 CP from the Faculty of Mathematics and Informatics at Freie Universität Berlin have the option of choosing and completing modules from the elective part with a module exam graded separately with a scope of 10 CP in total instead of the "Logic and Discrete Mathematics

for Teacher Training (10 CP)" module.

(5) Module offerings from other faculties of Freie Universität Berlin can be selected as a module offering 60 CP from other teacher-training areas as per paragraph 1 no. 2, provided that selection of such a module is possible for admission to a teacher training-related master's degree program in connection with completion of a bachelor's degree. As part of the bachelor's degree program alongside the core subject, a module offering 60 CP for one of the topics should be completed as per § 3 Lehramtszugangsverordnung (LZVO - Regulation on Access to Teacher Training) in connection with Annex 2 of the LZVO and the field of study ABV LBW-ISS-GYM. In addition, students on the bachelor's degree program should be granted the choice for the desired module offering 60 CP on the basis of resolutions from the relevant applicable institutions. This correspondingly applies to module offerings from other universities in Berlin and Brandenburg. The catalog of available module offerings will be issued in an appropriate manner in good time.

(6) The module descriptions in Annex 1 provide information for the modules in the module offerings regarding admission requirements, contents and qualification objectives, forms of teaching and learning, time requirements, forms of active participation, examination work required alongside studies, obligations regarding regular participation in the forms of teaching and learning, credit points assigned to the relevant modules, normal duration, and frequency of offering. With regard to the other modules in the compulsory part, reference is made to the Study and Examination Regulations for the Bachelor's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin. For other modules in the elective part, reference is made to the Study and Examination Regulations for the Bachelor's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin, and the Study and Examination Regulations for the Master's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin. Reference is made to the relevant Study and Examination Regulations for the modules of the selected module offering 60 CP as per par. 1 no. 2.

(7) The examples of courses of study as a Bachelor's degree program in Annex 2.1 provide information on the recommended study sequence.

§ 12

Field of study teacher training studies for incorporated secondary schools and grammar schools

(1) The modules of the field of study LBW-ISS-GYM provide students with fundamental pedagogical and didactic knowledge, enable a theory-based reflection of their teaching experiences, and prepare the student to make a decision regarding their profession based on the qualifications and experiences that were gained.

(2) The modules of the field of study LBW-ISS-GYM are described in their current relevant version in the

Study and Examination Regulations for the teacher training studies as part of bachelor's degree programs with a teaching option offered by Freie Universität Berlin (SPO- LBW-ISS-GYM).

(3) The field of study LBW-ISS-GYM covers pedagogical and didactic modules. Advice regarding the general rules of the field of study is provided by the course advisor in conjunction with the Teacher Training Center.

(4) The modules as per Par. 1 and credit points earned therein must not coincide with modules and credit points of the core subject as per § 11 Pars. 1 No. 1 and the selected module offering 60 credit points as per § 11 Pars. 1 No. 2.

§ 13 Bachelor's Thesis

(1) The purpose of the Bachelor's Thesis is to demonstrate that the student is capable of working independently on a question from the field of informatics and presenting and assessing the results obtained from this work competently in written form.

(2) Students will be admitted to work on a Bachelor's thesis upon application if they can prove at the time of application that they

1. in the first instance have been enrolled at Freie Universität Berlin and
2. have already successfully completed modules in the Bachelor's degree course worth at least 60 CP, including the "Algorithms, Data Structures, and Data Abstraction (9 CP)" module (9 CP).

(3) The application for admission of the Bachelor's thesis is to be accompanied by evidence of the prerequisites in accordance with paragraph 2, as well as confirmation from an authorized teacher that he or she is willing and able to act as supervisor for the Bachelor's thesis. The competent Examination Committee decides on the application. If a statement of acceptance for the supervision of the Bachelor's thesis is not submitted in accordance with sentence 1, the examining board will appoint a supervisor.

(4) The examining board, in consultation with the supervisor, assigns the topic of the Bachelor's thesis. The theme and set tasks must be of such a nature that the work can be completed within the assigned period. The task and compliance to deadlines are to be documented.

(5) The work may also be carried out externally at a suitable company or at a scientific institution, provided that scientific supervision is guaranteed in accordance with paragraph 3.

(6) The Bachelor's thesis should be 6,000 words long, approximately 20 sides in length. The time to be spent on the Bachelor's thesis amounts to 12 weeks. It may be written in either German or English. The Bachelor's thesis can also be written in another language not stated in Phrase 2 after approval by the examining board. If a student has been prevented from

working on the thesis for a period of more than four weeks for a valid reason, the examining board will decide whether the Bachelor's thesis must be begun afresh. Examination performance with regard to the Bachelor's thesis will be deemed not to have been undertaken in cases when the examining board has decided upon a further attempt.

(7) The date set for the start of work on the topic is determined by the examining board. The topic can be returned within the first four weeks, and in those cases it will not be considered as issued. Upon submission, the student must provide written confirmation that he or she has composed the Bachelor's thesis without assistance and has used no other sources or resources apart from those cited and acknowledged. The Bachelor's thesis is to be submitted typewritten as three bound copies and as an electronic version in accordance with §7.

(8) The results of the Bachelor's thesis are to be given as part of a presentation, scientifically classified (approx. 15 minutes) and defended (approx. 15 minutes) The prerequisite for giving a presentation is the submission of the Bachelor's thesis. The oral presentation is to take place as soon as possible after the Bachelor's thesis has been submitted. The appointment is announced well ahead of time in an appropriate form. The lecture and discussion are open to the faculty. The presentation is not included in the grading for the Bachelor's thesis.

(9) The Bachelor's thesis shall be evaluated in a written statement within four weeks by two examiners appointed by the examining board. The supervisor of the Bachelor's thesis should be one of the examiners. The examiners should have attended the presentation as per Par. 8.

(10) The Bachelor's thesis will be considered to have passed if the combined grade attained for the Bachelor's thesis is at least "sufficient" (4.0).

(11) The examining board can, upon request, recognize a successfully completed Bachelor's thesis from another institution of higher education or in another subject in cases when the qualification is equivalent. The application must be accompanied by a bound copy of the Bachelor's thesis and a copy in electronic format, as well as proof that the Bachelor's thesis has been assessed and evaluated.

§ 14 Studies abroad

(1) It is recommended that students participate in studies abroad. Within the framework of study abroad, credit points are acquired that count towards the Bachelor's degree program and supplementary fields of study.

(2) Study abroad be preceded by conclusion of an agreement between the student, the Chairman of the examining board relevant for the degree program, and the target university regarding the duration of the period

of studies abroad, the scope of performances expected during the studies abroad, which are to be equivalent to the performance items in the Bachelor's Program, and the credit points to be assigned to these performance items. Performance items completed as per the agreement are then credited accordingly.

(3) It is recommended that studies abroad are carried out during the third and/or fourth semester of a Bachelor's degree program.

§ 15 Graduation

(1) The graduation requirement for the Bachelor's degree program is that the scope of study performance as required by §§ 11 and 13 of these regulations has been completed.

(2) Graduation is not permitted if the student has conclusively failed to complete a required scope of performance or conclusively failed to pass required examinations or is involved in a pending examination procedure at a university in the same course of studies, or in a module that is identical or comparable to a module completion of which is required for the Bachelor's Program and the grade for which counts towards the overall grade.

(3) The application for recognition of graduation must be accompanied by proof of satisfaction of the requirements as per Par. 1 and a statement confirming that none of the cases under Par. 2 applies to the person of the applicant. The competent Examination Committee decides on the application.

(4) The university degree Bachelor of Science (B. Sc.) is awarded upon passing the examination. Students receive a Report of Grades and a Diploma (Annexes 2 and 3) as well as a Diploma Supplement (in English and German). A further supplement to the Report of Grades is also issued that contains information on the individual modules and their content (Transcript). An English translation of the Report of Grades and Diploma are also issued on request.

2. Section:

Module offering 60 credit points in informatics as adjuncts to other courses of study

§ 16 Admission requirement:

The admission requirement for the module offering 60 CP is admission to a bachelor's degree program at Freie Universität Berlin with a core subject in the scope of 90 CP corresponding to one of the subjects as per § 3 Lehramtszugangsverordnung (LZVO) in connection with Annex 2 of LZVO, if the combinability with the module offering 60 CP is not precluded through over regulations. The catalog of possible Bachelor's degree courses will be issued in good time before the

admission procedure.

§ 17 Qualification objectives:

(1) Graduates of the module offering 60 credit points are aware of the spectrum of essential basic terminology in informatics and methods from fundamental areas in informatics (theoretical, practical, and applied informatics), as well as phenomena of socio-technical systems. If necessary, they are able to expand or update this knowledge or these skills. They are able to analyze an informatics-related issue of simple complexity, or to approximately model it using appropriate means whilst also being able to express themselves either in a manner that is appropriate for informatics experts or for those within the application at hand. They can construct, implement, document, and test a rudimentary software system on their own or in a team. At the same time, they can also independently work on sub-tasks in larger projects, record the results of others, and pass on their own results. They are able to recognize the socio-technical effects of computer systems and assess them to some extent. They can critically evaluate and act responsibly.

(2) They can also apply and explain informatics thinking even in non-technical environments. They can acquaint themselves with new applications and technologies. They can critically evaluate and act responsibly. They are capable of reflective and constructive handling of inequality in gender and diversity aspects whilst also being able to work responsibly in a team with sensitivity in such areas.

(3) Students of the module offering 60 CP are, upon completion of the bachelor's degree program associated with the module offering 60 CP, qualified for further master's degree programs, particularly those that are teaching-oriented. They can also specialize in other Master's degree programs alongside fields of work that have more of an educational focus. In addition, they may also acquire skills across disciplines, such as in the fields of science journalism and publishing, "Public Understanding of Science" and public relations work that focuses on the preparation and dissemination of scientific content. They can work in functions that focus on the design, development, or operation of computer systems.

§ 18 Study contents

(1) In the module offering 60 CP software systems and their requirements are analyzed and formalized based on mathematical and informatics theories and methods. Techniques of designing and realizing new software systems are learned. Fundamental methods for programming computers are learned in Algorithms and Programming. The fundamental options and limits of calculating are learned in theoretical informatics as

well as techniques for estimating the inherent effort of specific algorithmic processes. Technologies with a view of their use are covered in practical informatics. Fundamental uses of language and methods of formal discourse regarding software are learned and practiced in Mathematics for Informatics.

(2) Students acquire individual skills as part of the course, including the educational components that beneficially enhance informatics expertise for work within this sector, or they acquire fundamental knowledge in an application within informatics which enables them to easily work together with specialists in this field to discover solutions to informatics-related application problems within the sector under specific technical, economic, and social conditions.

§ 19

Structure and outline; scope of performance

(1) A total of 60 credit points must be earned as part of the module offering 60 credit points. The module offering 60 CP is divided into a mandatory part with a scope of 50 CP and an elective part with a scope of 10 CP.

(2) Modules with a scope of 50 CP should be completed in the mandatory part.

The following modules must be completed:

- Module: Functional Programming (9 CP),
- Module: Object-oriented Programming (8 CP),
- Module: Logic and Discrete Mathematics for Teacher Training (10 CP),
- Module: Database systems (7 CP),
- Module: Fundamentals of Theoretical Computer Science (7 CP),
- Module: Algorithms, Data Structures, and Data Abstractions (9 CP).

(3) In the elective part, modules comprising 10 CP should be chosen and completed, of which at least one module should feature a module exam that is evaluated separately. The following modules are offered:

- Module: Computer architecture (5 CP),
- Module: Operating and Communication Systems (5 CP).
- Module: Software technology (10 CP),
- Module: System management (5 CP),
- Module: Software project B (10 CP),
- Module: Non-sequential and distributed programming for teacher training (10 CP),
- Module: Effects of informatics (5 CP),
- Module: Social aspects of Practical Computer Science (5 CP),
- Module: Fundamentals of Technical Computer Science (10 CP),
- Module: Research internship (5 CP)

- Module: Scientific work within informatics (5 CP),

In addition, modules can be selected from the master's degree program in informatics from the Faculty of Mathematics and Informatics of Freie Universität Berlin as individual advanced modules.

(4) Students taking the mathematics core subject from the Faculty of Mathematics and Informatics at Freie Universität Berlin have the option of choosing and completing modules from the elective part with a module exam graded separately with a scope of 10 CP in total instead of the "Logic and Discrete Mathematics for Teacher Training (10 CP)" module.

The module descriptions in Annex 1 provide information for the modules in the module offerings regarding admission requirements, contents and qualification objectives, forms of teaching and learning, time requirements, forms of active participation, examination work required alongside studies, obligations regarding regular participation in the forms of teaching and learning, credit points assigned to the relevant modules, normal duration, and frequency of offering. With regard to the other modules in the mandatory part, reference is made to the Study and Examination Regulations for the Bachelor's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin, for other modules in the elective part, reference is made to the Study and Examination Regulations for the Bachelor's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin, and the Study and Examination Regulations for the Master's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin.

(6) The examples of courses of study in module offerings with 60 credit points in Annex 2.2 provide information on the recommended study sequence.

III. Final provisions

§ 20

Entry into force and transitional regulation

(1) These regulations come into form on the day following their publication in the Official Gazette of the Free University of Berlin (FU Announcements) on 1 October 2015.

(2) At the same time, the Study and examination regulations for the Bachelor's degree program and the module offering 60 credit points of 27 August 2014 (FU Announcements 38/2014, p. 864) become invalid.

(3) These regulations apply to students who matriculate following their entry into force for the Bachelor's Program at Freie Universität Berlin or registration for the module offering 60 CP at Freie Universität Berlin.

(4) These regulations also apply for continuation of the course and provision of the services for students that are matriculated before these regulations regarding

the bachelor's degree program at Freie Universität Berlin came into force. Alternatively they are registered for the module offering 60 CP at Freie Universität Berlin, and have up until now studied on the basis of the Study and Examination Regulations as per par. 2 and satisfied the requirements.

(5) Students who are matriculated for the bachelor's degree program or registered for the module offering 60 CP at Freie Universität Berlin before this regulation comes into force, and who study and perform based on the study regulations for the bachelor's degree program and the module offering from 6 December 2006 (Freie Universität Official Announcements 10/2009, p. 104) and the examination regulations for the bachelor's degree program and the module offering from 6 December 2006 (Freie Universität Official Announcements 10/2009, p.115), continue their studies and perform as per the study regulations for the bachelor's degree program and the module offering from 6 December 2006 (Freie Universität Official Announcements 10/2009, p. 104) and the examination regulations for the bachelor's degree program and the module offering from 6 December 2006 (Freie Universität Official Announcements 10/2009, p.115), provided that they have not requested continuation of the course and performance of the exam as per this regulation from the examining board. In the latter case, on the occasion of the transcription resulting from said application, the Examination Committee shall make a decision regarding the crediting of credit points earned within the framework of these regulations, whereby the principles of legitimate expectation and equal opportunity are respected. The decision regarding the transfer application will become effective at the beginning of the lecture period of the relevant semester. Transfer of an application as per phrase 1 cannot be revised.

(6) The opportunity to complete the course of studies according to the Study Regulations for the bachelor's degree course and the module offering from 6 December 2006 (Freie Universität Official Announcements 10/2009, p. 104) and the examination regulations for the bachelor's degree program and the module offering from 6 December 2006 (Freie Universität Official Announcements 10/2009, p. 115) is ensured in connection with § 19 para. 4 of the Study and Examination Regulations as per para. 2 until the end of the 2017 summer semester.

Annex 1: Module descriptions

Explanations:

The following module descriptions refer to every module of the Bachelor's degree course unless reference is made to other regulations for the module offering with 60 credit points

- the designation of the module
- those who are responsible for the module
- requirements for admission to each module,
- content and qualification objectives of module,
- teaching and learning forms of module
- estimated student effort requirement to complete the module,
- forms of active participation,
- examination forms,
- mandatory regular participation,
- the credit points assigned to the modules
- normal duration of module,
- frequency of course offering,
- applicability of the module

The information on time requirements refer in particular to

- active participation in on-campus study period,
- time required for completion of minor tasks related to on-campus study period,
- time for independent preparation and follow-up,
- processing of study units in online study phases,
- preparation time immediately prior to examinations
- examination time.

The information on time requirements for self-study (including preparation and follow-up, examination preparations, etc.) are guideline values to help students organize the time required for module-related work. The information on work effort requirements corresponds to the number of credit points assigned to each module as the unit of measure for student work effort as an approximation of the work required to complete the module successfully. A credit point is equivalent to 30 hours.

To the extent the required study performance includes regular participation, this is established, as well as active participation in the teaching and learning forms and successful completion of the examination requirements of each module, as a precondition for acquiring the credit points assigned to the respective module. Regular participation compliance is when at least 85% of the on-campus study time scheduled in the teaching and learning forms of a module were attended. Even if there is no mandatory regular participation in a type of learning for a module, it is strongly recommended nonetheless. The relevant instructor cannot establish compulsory presence for types of learning for where participation is merely recommended.

Module exams - if assigned - must be taken for each module. Graded modules are completed with only one examination (module exam). The module exam must reflect the qualification objectives of the module. It tests whether the objectives of the module have been reached based on an exemplary sampling. The scope of the examination is limited to what is required to achieve this. In modules for which alternative examination forms are planned, the examination form for each semester must be determined by the responsible instructor by the first course date at the latest.

Active and - if provided - regular participation in the teaching and learning forms as well as successful completion of the examination requirements of each module, are the preconditions for acquiring the credit points assigned to each module. In modules with no module examination, active participation as well as regular participation in the teaching and learning forms are the preconditions for acquiring the credit points assigned to each module.

I. Mandatory part

Module: Object-oriented Programming			
University/Faculty/Institute: Free University of Berlin/Mathematics and Informatics/Informatics			
Persons responsible for module: Lecturer for the module			
Admission requirements: None			
Qualification objectives: At the end of the module, students master imperative and object-oriented programming concepts and their applicability, and can create object-oriented models. They are aware of fundamental data structures and algorithms, and are able to specify and implement abstract data types. They are aware of fundamental data structures and algorithms, and can formally and informally prove the properties of small programs. They can implement object-oriented programs and use design patterns that are appropriate for the problem.			
Contents: The following themes are covered: <ul style="list-style-type: none"> • Mechanical modeling of the predictability term (register machines) and central imperative programming concepts. • Evidence of features of small programs (Hoare logic and/or predicate transformer semantics). • Object-oriented programming concepts (such as classes, objects, references, methods, inheritance, polymorphic type systems, abstract classes, interfaces, generic class definitions, encapsulation, error handling, etc.). • Simple data structures and implementation thereof whilst using object-oriented programming techniques as well as fundamental concepts of data abstraction. • Advanced object-oriented modeling techniques and fundamental design patterns (iterators, observer patterns, structural patterns, MVC etc.) • Realization/implementation of concepts is introduced based on modern, currently used, object-oriented programming languages. 			
Forms of teaching and learning	On-campus studies (hours per semester week = SWH)	Forms of active participation	Work effort (hours)
Lecture	4	Written work on assigned exercise sheets, two oral presentations regarding the solution to a task in the exercise	On-campus time L 60
			Preparation and follow-up L 30
Seminar on PC	2		On-campus time E 30
			Preparation and follow-up E 90
			Examination preparation and examination 30
Module exam:		Written exam (120 minutes)	
Course language:		German	
Mandatory regular participation:		Lecture: Participation recommended, seminar on PC: Yes	
Total working time requirement:		240 hours	8 CP
Duration of module:		One semester	
Frequency of course offering:		Each summer semester	
Applicability:		Bachelor's degree course Informatics for Teacher Training	

Module: Logic and Discrete Mathematics for Teacher Training			
University/Faculty/Institute: Free University of Berlin/Mathematics and Informatics/Informatics			
Persons responsible for module: Lecturer for the module			
Admission requirements: None			
Qualification objectives: At the end of the module, students are aware of fundamental concepts in logic, set theory, and combinatorial analysis. They can apply these to mathematical modeling of applications within informatics. They are able to understand mathematical proofs and also to develop simple proofs themselves in context with informatics-related problems. They can think abstractly and formalize simple matters within a logic. They master fundamental aspects of discrete mathematics and can apply combinatorial techniques in practice (such as in designing and analyzing algorithms).			
Contents: Propositional logic and mathematical proof techniques – Boolean formulas and Boolean functions, DNF and CNF, satisfiability, resolution calculation – Set theory: Sets, relations, equivalence and order relations, functions – Natural numbers and complete induction, countability – Predicate logic and mathematical structures – Combinatorial analysis: Counting principles, binomial coefficients and Stirling numbers, recursion, pigeonhole principle, discrete probability distributions – Graph theory: Graphs and their illustrations, paths and cycles in graphs, trees			
Forms of teaching and learning	On-campus studies (hours per semester week = SWH)	Forms of active participation	Work effort (hours)
Lecture	4	Written work on assigned exercise sheets, oral presentation of solutions to selected tasks in the exercises	On-campus time L 60 Preparation and follow-up L 60
Exercise	2		On-campus time E 30 Preparation and follow-up E 120 Examination preparation and examination 30
Module exam:		Written exam (120 minutes), the written exam can also be carried out in the form of an electronic examination (120 minutes)	
Course language:		German	
Mandatory regular participation:		Lecture: Participation recommended, exercise: Yes	
Total working time requirement:		300 hours	10 CP
Duration of module:		One semester	
Frequency of course offering:		Each winter semester	
Applicability:		Bachelor's degree course Informatics for Teacher Training 60 CP module offering in Informatics	

Module: Computer architecture			
University/Faculty/Institute: Free University of Berlin/Mathematics and Informatics/Informatics			
Persons responsible for module: Lecturer for the module			
Admission requirements: None			
Qualification objectives: At the end of the module, students understand the following: the fundamental architectural features of computer systems, interactions of architectural features in multi-core and multi-processor systems, and elementary options for speeding up computer systems.			
Contents: In particular, topics include Harvard/von Neumann architecture, RISC/CISC micro-architecture, micro-programming, pipelining, caches, storage hierarchy, bus systems, assembler programming, multi-processor systems, VLIW, branch predictors. At the same time, internal number representation, computer arithmetic, and representation of other data types in the computer are covered.			
Forms of teaching and learning	On-campus studies (hours per semester week = SWH)	Forms of active participation	Work effort (hours)
Lecture	2	Written work on assigned exercise sheets, oral presentation of solutions to selected tasks in the exercises	On-campus time L 30
			Preparation and follow-up L 30
Seminar on PC	2		On-campus time SPC 15
			Supervised self-study on PC 15
			Examination preparation and examination 60
Module exam:		Written exam (60 minutes), the written exam can also be carried out in the form of an electronic examination (60 minutes)	
Course language:		German	
Mandatory regular participation:		Lecture: Participation recommended, seminar on PC: Yes	
Total working time requirement:		150 hours	5 CP
Duration of module:		One semester	
Frequency of course offering:		Each winter semester	
Applicability:		Bachelor's degree course Informatics for Teacher Training 60 CP module offering in Informatics	

Freie Universität Official Announcements

Module: Operating and Communication Systems			
University/Faculty/Institute: Free University of Berlin/Mathematics and Informatics/Informatics			
Persons responsible for module: Lecturer for the module			
Admission requirements: None			
Qualification objectives: At the end of the module students understand the following: the role of the operating system as an abstraction of the computer system, the fundamental construction of current operating systems, the function and structure of the Internet. They can program computers at an assembler level and are very close to the system, they can assess the benefits and drawbacks of various mechanisms (PIO vs. DMA, polling vs. interrupt, paging vs. segmentation, etc.), expediently use mechanisms of operating systems, can allow programs to communicate via the network. Input/output systems, DMA/PIO, interrupt handling, buffers, processes/threads, virtual storage, UNIX and Windows, shells, utilities, peripherals and networking, networks, media, media access, protocols, reference models TCP/IP, fundamental structure of the Internet			
Contents: In particular, topics include input/output systems, DMA/PIO, interrupt handling, buffers, processes/threads, virtual storage, UNIX and Windows, shells, utilities, peripherals and networking, networks, media, media access, protocols, reference models TCP/IP, fundamental structure of the Internet.			
Forms of teaching and learning	On-campus studies (hours per semester week = SWH)	Forms of active participation	Work effort (hours)
Lecture	2	Written work on assigned exercise sheets, oral presentation of solutions to selected tasks in the exercises	On-campus time L 60 Preparation and follow-up L 30
Seminar on PC	2		On-campus time E 30 Preparation and follow-up E 120 Examination preparation and examination 30
Module exam:		Written exam (60 minutes), the written exam can also be carried out in the form of an electronic examination (60 minutes)	
Course language:		German	
Mandatory regular participation:		Lecture: Participation recommended, seminar on PC: Yes	
Total working time requirement:		180 hours	5 credit points
Duration of module:		One semester	
Frequency of course offering:		Each summer semester	
Applicability:		Bachelor's degree course Informatics for Teacher Training 60 CP module offering in Informatics	

For the remaining modules of the mandatory part, reference is made to the Study and Examination Regulations for the bachelor's degree program in Informatics of the Faculty of Mathematics and Informatics of Freie Universität Berlin.

II. Elective part

Module: Non-sequential and distributed programming for teacher training
University/Faculty/Institute: Free University of Berlin/Mathematics and Informatics/Informatics
Persons responsible for module: Lecturer for the module
Admission requirements: Successful conclusion of the object-oriented programming module
<p>Qualification objectives:</p> <p>Students understand the basic terms of non-sequential programming with a joint memory that interact with each other. They can appropriately structure non-sequential programs with processes/threads/active objects and also avoid unwanted non-deterministic effects and deadlocks via suitable synchronization processes. They are aware of and understand security risks that may occur in non-sequential programming and can use methods to avoid these. They can formally specify the features of processes and threads and verify these using examples.</p> <p>Students can distinguish between relevant interaction paradigms such as client/server and peer-to-peer, and classify own applications appropriately in line with these paradigms, and construct distributed systems based on inter-process communication and remote calls. They can appropriately design, structure, and realize web applications, client/service provider applications, and peer-to-peer applications, and develop distributed systems with the aid of suitable middleware.</p>
<p>Contents:</p> <p>Programming and synchronization of simultaneously running processes that access the same memory or interact with each other.</p> <ul style="list-style-type: none"> – Non-sequential programming and processes in its various formats, non-determinism, determinism – Synchronization mechanisms: Locks, monitors, guards, events, semaphores – Non-sequential programming and object orientation – Sequence control, selection strategies, priorities, handling and avoiding deadlocks – Coroutines, implementation, multi-processor systems – Interaction via messages, security aspects of applications in the network – Programming and synchronization of simultaneously running processes that interact with each other – Remote call technologies – Client-server, peer-to-peer – Parallel computing within the network – Coordination languages, orchestration, choreography – Processing on the server and the client, mobility – Middleware, structured communication, static and dynamic interfaces – Event-based and stream-based processing – Security of applications in network, securing protocols – Outlook on non-functional features (time, memory, quality of service) <p>The prerequisite is knowledge of the “Algorithms, data structures, and data abstraction” module. During self-study, students acquire knowledge of operating systems that are linked with non-sequential programming (such as pipelining, caches, storage hierarchy, interrupt handling, buffers, processes/threads).</p>

Freie Universität Official Announcements

Forms of teaching and learning	On-campus studies (hours per semester week = SWH)	Forms of active participation	Work effort (hours)
Lecture	4	Written work on assigned exercise sheets, oral presentation of solutions to selected tasks in the exercises	On-campus time L 60
			Preparation and follow-up L 60
Exercise	2		On-campus time E 30
			Preparation and follow-up E 120
			Examination preparation and examination 30
Module exam:		Written exam (120 minutes), the written exam can also be carried out in the form of an electronic examination (120 minutes)	
Course language:		German	
Mandatory regular participation:		Lecture: Participation recommended, exercise: Yes	
Total working time requirement:		300 hours	10 CP
Duration of module:		One semester	
Frequency of course offering:		Each summer semester	
Applicability:		Bachelor's degree course Informatics for Teacher Training 60 CP module offering in Informatics	

With regard to the remaining modules in the compulsory part, reference is made to the Study and Examination regulations for the bachelor's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin and the Study and Examination regulations for the master's degree program in Informatics from the Faculty of Mathematics and Informatics at Freie Universität Berlin.

Annex 2.1: Example of course of studies for the Bachelor's degree course Informatics for Teacher Training

Semester	Topics in core subject 90 CP				60 CP module offering 60 CP	LBW-ISS-GYM 30 CP	
	Algorithms and programming	Technical computer science	Theoretical and practical computer science				
1. FS 33 CP	Functional Programming (9 CP)				Logic and Discrete Mathematics for Teacher Training (10 CP)	Educational science/internship (11 CP)	
2. FS 32 CP	Object-oriented Programming (8 CP)			Fundamentals of Theoretical Computer Science (7 CP)	Module or modules with a scope of 10 CP		
3. FS 28 CP	Algorithms, Data Structures, and Data Abstractions (9 CP)	Computer architecture (5 CP)			Module or modules with a scope of 10 CP	Basic didactics subject 1 (7 CP)	
4. FS 30 CP			Software technology (10 CP)	Database systems (7 CP)	Module or modules with a scope of 10 CP		
5. FS 29 CP					Module or modules with a scope of 10 CP	Basic didactics subject 2 (7 CP)	
6. FS 28 CP			Selected module from the elective part with a scope of 15 CP in total	Bachelor's thesis (10 CP)	Module or modules with a scope of 10 CP		German as a second language / language training (5 CP)

Annex 2.2: Example of course of studies for the 60 CP Informatics module

Semester	Topics			
	Algorithms and programming	Elective part	Theoretical and practical computer science	Mathematics for informatics
1. FS 9 CP	Functional Programming (9 CP)			
2. FS 8 CP	Object-oriented Programming (8 CP)			
3. FS 10 CP				Logic and Discrete Mathematics for Teacher Training (10 CP)
4. FS 12 CP		Selected module from the elective part with a scope of 5 CP in total	Fundamentals of Theoretical Computer Science (7 CP)	
5. FS 9 CP	Algorithms, Data Structures, and Data Abstractions (9 CP)			
6. FS 12 CP		Selected module from the elective part with a scope of 5 CP in total	Database systems (7 CP)	

Appendix 3: Report of Grades (sample)



Freie Universität Berlin
 Department of Mathematics and Computer Science

Report of Grades

Ms./Mr. [first name/last name]

Date of birth [day/month/year] in [place of birth]

has successfully completed the Bachelor's Program in

Informatics for Teacher Training

on the basis of the Examination Regulations of 13 May 2015 (FU Announcements 27/2015) with the overall grade

[grade as number and text]

and earned the required number of 180 credits.

Evaluation of examination results:

Field(s) of study	Credit points	Grade
Core subject is Informatics for Teacher Training, of which 10 CP is for the bachelor's thesis	90 (...) 10 (10)	n,n n,n
Module offering 60 credit points [XX]	60 (...)	n,n
Teacher training studies for incorporated secondary schools and grammar schools (LBW-ISS-GYM)	30 (...)	n,n

The them of the Bachelor's Thesis was: [XX]

Berlin, this day of [day/month/year]

(seal)

Dean

Chairman of the Examining Board

Grading scale: 1.0 – 1.5 very good; 1.6 – 2.5 good; 2.6 – 3.5 satisfactory; 3.6 – 4.0 sufficient; 4.1 – 5.0 insufficient
 Grades not evaluated separately: BE – passed; NB – not passed

The credit points are in accordance with the European Credit Transfer and Accumulation System (ECTS).

Some study work is not graded; the credit points in parentheses reflect the scope of graded performance levels that impact the overall grade.

Appendix 4: Diploma (sample)



Freie Universität Berlin
Department of Mathematics and Computer Science

Certificate

Ms./Mr. [first name/last name]

Date of birth [day/month/year] in [place of birth]
has successfully completed the Bachelor's Program in

Informatics for Teacher Training

Based on the Examination Regulations of 13 May 2015 (FU Announcements No. 27/2015)

the university degree

Bachelor of Science (B. Sc.)

is awarded.

Berlin, this day of [day/month/year]

(seal)

Dean

Chairman of the Examining Board