Technische
Universität
Berlin

AMTLICHES MITTEILUNGSBLATT

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Study and Examination Regulations for the Bachelor's Degree Program in Computational Engineering Science at Faculty V - Mechanical Engineering and Transport Systems at Technische Universität Berlin

of 17 January 2018

On 17 January 2018, the Faculty Board of Faculty V - Mechanical Engineering and Transport Systems of Technische Universität Berlin adopted the following Study and Examination Regulations for the Bachelor's Program in Computational Engineering Science, in accordance with Section 18 (1) no. 1 of the Constitution of Technische Universität Berlin and Section 71 (1) no. 1 of the Berlin State Higher Education Act (*Berliner Hochschulgesetz* – BerlHG), in the version of 26 July 2011 (Berlin Gazette of Laws and Ordinances [*GVBl.*], p. 378), last amended by Section 17 of the *BerlHG* on 19 December 2017 (Berlin Gazette of Laws and Ordinances, p. 695).[*)]

Content

I. General regulations

Section 1 – Scope of application

These study and examination regulations govern both the objectives and organization of studies, and the requirements and conducting of examinations in the bachelor's program in Computational Engineering Science. The program-specific provisions included herein supplement the Regulations Governing General Study and Examination Procedures of Technische Universität Berlin (*Ordnung zur Regelung des allgemeinen Studien- und Prüfungsverfahrens* - AllgStuPO).

Section 2 – Entry into force/expiration

(1) These regulations shall enter into force on the day after their publication and apply to students enrolling from the 2018/19 winter semester (1 October 2018) onwards.

(2) The Study and Examination Regulations for the bachelor's program in Computational Engineering Science of 29 December 2009 (TU Official Gazette 19/2010 p. 290) cease to be effective three semesters after the entry into force of these regulations. Students who have not completed their studies at the time of expiry in accordance with Sentence 1 shall continue their studies in line with these regulations.

(3) Students enrolled in the bachelor's program in Computational Engineering Science at Technische Universität Berlin prior to the entry into force of these Study and Examination Regulations shall decide within three semesters of the entry into force of these regulations as to which set of regulations they wish to continue their studies under. This decision is irrevocable and to be recorded on file at the department of the Central University Administration responsible for such documentation.

II. Program objectives and structure

Section 3 - Learning outcomes, program content and professional fields

The goal of the degree program is to award a Bachelor of Science degree and thus an initial professional degree in the field of computational engineering sciences. The degree program aims to impart basic skills and concepts from information technology and engineering as well as the methods needed to undertake activities in construction, production, and process engineering. Graduates will be able to apply relevant methods from the subject area as well as optimize, automate, and implement machines, processes, and techniques. Graduates will also be able to understand information technology problems and phenomena in mechanical engineering and energy and process engineering and develop solutions to these problems. They have a good understanding of the fundamental principles of computer-aided design and production as well as process systems engineering. Measurement and control technology and process control form a further central component of students' training. Graduates will be qualified to apply their knowledge in a variety of fields adopting a socially and ecologically responsible approach. It is recommended that graduates permanently develop their acquired knowledge; in particular, they are qualified for a research-oriented master's program.

Students in the bachelor's program in Computational Engineering Science can prepare for master's studies with the following areas of focus

- Design and production
- Process systems engineering
- Mechatronics
- Specialization in other areas (e.g. patent systems, journalism, media informatics, business administration)

Graduates will possess the following skills and qualities:

- Command of the natural science and information technology methods needed to analyze the basic structure of a problem

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- Command of engineering methods and mathematical and physical principles needed to develop physical models for the computer-aided analysis of the technical processes they represent

- Command of the basic principles of application design and evaluation

- Ability to define problems and take on the resulting tasks working within teams whose members are assigned different responsibilities, process their own work independently, incorporate the results of others, as well as communicate their own results

- Methodological skills needed to successfully solve synthesis problems, particularly those of medium complexity with balanced consideration for the technical, economic, ecological, and social framework conditions

- Familiarity with selected fields of technology, forming a bridge between computer science, engineering principles, and professional applications

- Transferable skills, sensitizing them to non-technical demands in the profession

- Sufficient work-related experience gained during their studies to provide them with the interpersonal skills essential for a successful start to their careers

- Preparation for life-long learning and a career in a range of fields through the degree program's strong focus on fundamentals

The bachelor's degree in Computational Engineering Science is preceded by a broadly designed fundamental engineering curriculum with a focus on computer science and applied core subjects such as mechanical engineering and process engineering. Computational engineering science is the science of the development and application of information technologies for the construction, optimization, and automation of machines as well as processes and production plants. The degree program aims to develop and implement sustainable, economic, ecological, and technical concepts for computer-aided planning and automated operation.

This interdisciplinary and research-oriented degree program teaches fundamental mathematic, natural science, and computer science methods and comprehensive technical skills in design, manufacturing, and process systems engineering. These areas are supplemented by elective courses from other engineering applications, computer science, non-technical subjects, and the technical, economic, ecological, legal, and social aspects of computational engineering sciences.

Graduates are qualified to work in a broad range of fields and applications including, among others, the planning, design, construction, testing and operation of information processing systems and software in CA/CIM (Computer Aided Design/Computer Integrated Manufacturing), process and plant engineering, mechanical engineering, automation, and safety engineering.

Section 4 - Program start, standard period of study, and required coursework

(1) Students may begin their studies in the winter or summer semester. If a student commences studying in the summer semester, they need to plan particularly carefully to ensure they do not experience delays in the curriculum as a result of consecutive modules (see Annex 2).

(2) The standard period of study, including completion of the bachelor's thesis, is six semesters.

(3) The program encompasses 180 credit points (CP).

(4) The teaching curriculum and examination procedures are structured and organized in such a way as to enable students to complete the program within the standard period of study.

Section 5 - Program structure

(1) Students can structure their studies individually. They are, however, obliged to comply with the provisions laid out in these Study and Examination Regulations. The recommended sequence in which modules should be taken is shown in the proposed course schedule in Annex 2 of these regulations.

(2) The bachelor's program encompasses modules amounting to 156 credit points as well as a professional internship (12 credit points) and a bachelor's thesis (12 credit points). These modules are to be taken from the following module groups:

1. Compulsory modules totaling 96 credit points, including
   - Mathematics 27 CP
   - Technical and natural science basics 42 CP
   - Information technology basics 27 CP

2. Compulsory elective modules totaling 48 credit points, including
   - Control systems engineering 6 CP
   - Measurement engineering 6 CP
   - Area of engineering sciences at least 12 CP
   - Area of focus 18 CP
   - Project 6 CP

3. Electives (12 credits)

   These modules allow students to acquire additional subject-specific and generic skills as well as expertise that qualifies them for a profession and can be selected from the full range of subjects offered by Technische Universität Berlin, other universities or higher education institutions with equal status within the jurisdiction of the Framework Act for Higher Education as well as at universities and higher education institutions abroad recognized as equivalent. It is recommended that students select interdisciplinary courses. They can also choose modules for learning foreign languages.

(3) The skills taught in each module, module examination requirements, and admission requirements, if any, are updated biannually in the form of program-specific module catalogs in accordance with Section 33 (6) of the Regulations Governing General Study and Examination Procedures (AllgStuPO) and published at the beginning of the winter semester in October and at the beginning of the summer semester in April in the Official Gazette of Technische Universität Berlin.

(4) A six-week pre-internship is to be completed before the start of the lecture period of the first degree semester. Credit points are not awarded for the pre-internship as this is completed before the student commences studying. A professional internship lasting at least 12 weeks and worth 12 credit points is also required. Further details are regulated by the Internship Guidelines.

III. Examination requirements and conduct of examinations

Section 6 – Purpose of the bachelor's examination

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

Section 7 – Bachelor's degree

On behalf of Faculty V- Mechanical Engineering and Transport Systems, Technische Universität Berlin awards the academic degree "Bachelor of Science" (B.Sc.) to students who have passed the bachelor's examination.

Section 8 – Scope of the bachelor's examination, calculation of the overall grade

(1) The bachelor's examination comprises the module examinations listed in the module list (Annex 1), the professional internship, and the bachelor's thesis in accordance with Section 9.

(2) According to the principles stipulated in Section 47 AllgStuPO, the overall grade is to be determined by combining the grades achieved for those examinations arising from modules taken from the module catalog that are marked both as graded and for inclusion in the overall grade together with the grade achieved for the bachelor's thesis.

(3) The calculation of the overall grade is based on at least 75% of the student's overall performance (including the bachelor's thesis), that is on module grades amounting to at least 135 credit points. Ungraded modules and modules where the student achieved their lowest grades amounting to no more than 25% of the overall performance (45 credit points maximum) as well as the professional internship are not included. In the event that a student receives the same grade in different modules, the most recently completed module is not considered. Only fully completed modules are included in the calculation of the grade. Grades excluded from the calculation of the overall grade are identified accordingly on the final certificate. The grades of all modules are listed on the final certificate.

(4) Examinations that are taken in the first degree semester and that are failed at their first attempt, are disregarded. (non-binding attempt).

Section 9 – Bachelor's thesis

(1) The bachelor's thesis amounts to 12 credit points and is assigned a writing period of 3 months. If there are significant reasons beyond the student's control preventing them from completing the thesis within this time frame, the examination board shall grant an extension of the deadline for so long as the reasons in question continue to exist. The total possible extension may not exceed three months. In the event that the combined extensions exceed the stipulated maximum period of extension, the student may withdraw from the examination.

(2) The topic of the bachelor's thesis may be rejected once, however only within the first 2 months of being issued by the responsible department of the Central University Administration.

(3) To apply for admission to the bachelor's thesis, students are required to submit proof of completion of the pre-internship or an approved extension request to the responsible department in the Central University Administration.

(4) The examination board shall ensure the equivalence of topics and make certain that the bachelor's thesis can be completed within the writing period. Non-disclosure agreements and other regulations concerning secrecy extending beyond the usual obligations of confidentiality

and care are not permitted.

(5) The topic of the bachelor's thesis must be related to the underlying technology, natural science, and information technology principles and the compulsory elective modules or the chosen specialization.

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

(7) People with experience of professional activity and training can be appointed as examiners of final theses. As a rule, this applies primarily for the appointment of second reviewers. The first assessor must be an approved examiner and professor at Technische Universität Berlin.

Section 10 – Types of examination and registration for examinations

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

(2) The compensation principle is to be observed when conducting portfolio assessments. A passing grade for a single element must not be a necessary requirement for a student to pass the portfolio assessment as a whole.

(3) To register for the final exam, students must submit proof of a professional internship to the responsible department in the Central University Administration.

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

IV. Annexes

Annex 1: Module list

Annex 2: Sample Course Schedule

Please refer to the website
https://www.tu.berlin/en/studying/study-programs/all-programs-offered/study-course/computational-engineering-science-informationstechnik-im-maschinenwesen-b-sc/