Special provisions of the examination regulations for the bachelor's degree programme Computer Engineering in the Faculty of Computer Science, Electrical Engineering and Mathematics at Paderborn University

24 May 2024

as amended in the Official Notices 53.24 from 30 September 2024

(As of: 13 August 2024)

Paderborn University has issued the following regulations based on section 2 (4) and section 64 (1) of the "Gesetz über die Hochschulen des Landes Nordrhein-Westfalen (Hochschulgesetz - HG)" of 16 September 2014 (GV.NRW. p. 547), last amended by Article 2 of the Act of 5 December 2023 (GV. NRW. p. 1180):

This is a translation of the "Besondere Bestimmungen der Prüfungsordnung für den Bachelorstudiengang Computer Engineering der Fakultät für Elektrotechnik, Informatik und Mathematik an der Universität Paderborn".
Only the German original version of these special provisions shall be legally binding; the English translation serves convenience purposes only.

Contents

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Section 31 General and special provisions

These special provisions apply in conjunction with the version in force of the general provisions for bachelor's degree programmes of the Faculty of Computer Science, Electrical Engineering and Mathematics at Paderborn University (general provisions). A study plan is included in the appendix showing a proper structure for the programme.

Detail of the modules can be found in the module descriptions, which form a part of these special provisions.

Section 32 Acquiring competencies and language regulations

(1) The interdisciplinary degree programme Computer Engineering lies at the interface between electrical engineering and computer science. It qualifies students both for a master's degree programme and for professional work in the areas design, manufacturing, operation and analysis of computer systems, and in the technical applications of computer systems.

(2) During the programme, graduates gain the following competencies in particular:

- Subject-specific competencies:

  After completing the bachelor's program, students should have a command of the mathematical basis and fundamental concepts and methods of electrical engineering and computer science. In particular, they should gain fundamental technical knowledge in the following areas, and be able to use it:
  - fundamentals of electrical engineering,
  - electronic components,
  - the interplay between hardware and software in digital computing systems,
  - modelling and analysis of linear, continuous-time signals and dynamical systems with formal methods,
  - programming with object-oriented languages,
  - modelling techniques and algorithms,
  - designing hardware/software systems.

  Furthermore, the students should
  - master a broad spectrum of general scientific knowledge from electrical engineering and computer science, with a particular focus on the interface between the two subjects.
- Functional and systemic competencies:

  The students should also
  - be able to recognise problems, select suitable scientific methods to solve them and apply these appropriately,
  - be able to apply their technical knowledge in practice, both on their own and in a team, and to organise and carry out projects,
  - be able to act responsibly with regard to the effects of technological change.
- Communicative competencies:

Graduates are able to communicate on technical matters both orally and in writing. In particular, they can formulate problems and their solutions, and present them orally and in writing to experts and laypersons and defend them with arguments. In addition, they can efficiently exchange information within a team and are proficient in techniques and tools for structured collaboration.

(3) The bachelor's programme and examination are predominantly held in German. Modules in the English language are shown in the module descriptions.

Section 33 Start of studies

The programme can only be started in the winter semester.

Section 34 Admission requirements

There are no further admission requirements in accordance with section 5 of the general provisions.

Section 35 Structure, course content, and modules

(1) The bachelor's degree programme Computer Engineering is comprised of compulsory modules including the module Abschlussarbeit (156 CP) and compulsory elective modules (24 LP).

(2) In the first phase of the programme, the following compulsory modules are to be completed for 111 CP.

1. Höhere Mathematik I (compulsory module, 16 CP)
2. Stochastik für Ingenieure (compulsory module, 5 CP)
3. Grundlagen der Elektrotechnik A (compulsory module, 8 CP)
4. Grundlagen der Elektrotechnik B (compulsory module, 8 CP)
5. Halbleiterbauelemente für Computer Engineering (compulsory module, 5 CP)
6. Grundlagen des VLSI-Entwurfs (compulsory module, 5 CP)
7. Praktikum Mikrocontroller und Interface-Elektronik (compulsory module, 6 CP)
8. Signaltheorie (compulsory module, 5 CP)
9. Systemtheorie (compulsory module, 5 CP)
10. Programmierung I (compulsory module, 8 CP)
11. Programmierung II (compulsory module, 8 CP)
12. Modellierung (compulsory module, 6 CP)
13. Datenstrukturen und Algorithmen (compulsory module, 8 CP)
14. Digitaltechnik (compulsory module, 6 CP)
15. Rechnerarchitektur (compulsory module, 6 CP)
16. Betriebssysteme (compulsory module, 6 CP)

(3) In the second phase of the program, modules comprising 45 CP are to be completed:

1. Signal- und Informationsübertragung (compulsory module, 5 CP)
2. Rechnernetze (compulsory module, 5 CP)
3. Einführung in Data Science (compulsory module, 5 CP)
4. Systementwurf-Teamprojekt (compulsory module, 6 CP)
5. compulsory electives in electrical engineering (12 CP, two modules are chosen from the catologue of electrical engineering modules)
6. compulsory electives in computer science (12 CP, two modules are chosen from the catologue of electrical computer science - at least one of these from the area “Computer Systeme”)

(4) Furthermore, the following modules are to be completed for 24 CP:

1. Gesellschaft und Informationstechnik (compulsory module, 5 CP)
2. Proseminar (compulsory module, 4 CP)
3. Abschlussarbeit (compulsory module, 15 CP)

(5) On application and in individual cases, the Examination Committee may allow taking a course from a compulsory elective module in another compulsory elective module if the content of the course matches the subject of the compulsory elective module.

Section 35a Compulsory counselling

If half of the standard period of study has expired, at the earliest three months after the end of the second semester, and a student has completed examination assessments amounting to less than one third of the credit points to be achieved at the time of invitation, at the request of the university, students are obliged to participate in a study counselling session. Otherwise section 58a paragraph 3 sentence 2 of the “Gesetz über die Hochschulen des Landes Nordrhein-Westfalen” applies.

Section 36 Transfer of credits

Section 8 paragraphs 6 and 8, section 13 paragraph 3, and section 22 paragraph 5 of the general provisions do not apply to the bachelor's degree programme Computer Engineering.

Section 37 Examination committee and examiners

In addition to section 9 of the general provisions, the following stipulations apply to the composition of the Examination Committee. The Examination Committee consists of representatives of the Institute of Electrical Engineering and Information Technology, and the Institute of Computer Science. The participation of each institute is as follows:

1. Each institute involved has two members from the group of junior professor and professors. No. 2 remains unaffected.
2. The office of chairperson will be filled alternately with terms of office for each institute involved. The deputy chairperson is filled from the other institute.

3. The representative from the group of academic staff comes from the institute which is not providing the current chairperson.

Section 38 Individual course requirements and admission

(1) Module admission requirements in accordance with section 7 paragraph 2 of the general provisions are given in the module descriptions.

(2) Only students who, at the time of their application for admission, have successfully completed all the modules of the first study phase (section 35 paragraph 2) can be admitted to the bachelor's thesis.

(3) Further requirements for participation in examinations in accordance with section 12 paragraph 2 of the general provisions, such as any attendance regulations, are given in the module descriptions.

Section 39 Module assessments

(1) Assessments within a module must be completed in accordance with the module description.

(2) Examination assessments are taken in accordance with section 15 of the general provisions. The following other form is envisaged in particular:

Project work

In a project, students work alone or in a group on a topic specified by the members of the teaching staff. Project work generally includes documenting and presenting the work done, this latter in a talk of 30 to 45 minutes.

(3) In addition to the forms of assessment listed in section 15 of the general provisions, the following forms of assessment may also be considered:

1. Software with documentation: The submission of such artefacts may be required, particularly as part of project work, final theses or compulsory elective modules; a demonstration of the software may be required for successful submission. In this way, students demonstrate the acquisition of the competencies described in the relevant module. The software and the documentation are graded by an examiner. The time given to develop the software and documentation can be found in the module descriptions.
2 Mini-tests: Two short tests during the semester, usually lasting no more than 15 minutes.

(4) The examinations usually take place twice per academic year.

(5) In addition to the forms listed in section 15 of the general provisions, study achievements can also be completed by:

Progress reports: Progress reports or interim results of up to three pages DIN A4 must be submitted at predefined times. Students should use these to demonstrate their ongoing work with the content and methods of the subject.

Section 40 Bachelor's thesis, final presentation, further concluding achievements

(1) Five months are allowed for working on the bachelor's thesis. The bachelor's thesis should not exceed 50 DIN A4 pages. If the thesis takes less than four months to complete, the supervisor must justify this in writing to the Examination Committee.

(2) The module Abschlussarbeit consists of the thesis plan (qualified participation, workload 90 hours, determined by the first examiner) and the bachelor's thesis including an interim presentation and a final presentation (workload 360 hours).

(3) As a rule, four weeks after the announcement of the topic, the candidate presents the procedure and schedule for the bachelor's thesis in an interim presentation (approx. 20-30 minutes). As a rule, the topic and the results of the bachelor's thesis must be presented in a final oral presentation (approx. 30-45 minutes) four weeks after submission of the thesis. The final presentation is counted as part of the bachelor's thesis for the purpose of its evaluation.

Section 41 Additional modules

Students can partake in additional achievements for up to 30 additional credits in modules of the degree programme that do not have a participant limit, in accordance with section 20 of the general provisions. This upper limit also includes failed examinations.

Section 42 Final grade

(1) Contrary to section 21 paragraph 2 of the general provisions, the module Abschlussarbeit is given double weighting. Otherwise, the overall grade is calculated in accordance with section 21 of the general provisions.

(2) The grade "passed with distinction" is awarded if the final grade determined in accordance with section 21 paragraph 2 of the general provisions in conjunction with paragraph 1 is 1.1 or better.

Section 43 Repeating examinations and compensation

(1) The number of examination attempts, in accordance with section 22 paragraph 1 of the general provisions, is limited to four.

(2) Contrary to section 22 paragraph 2 of the general provisions, the final attempt at a written exam is taken as an oral exam of between 30 and 45 minutes. Section 15 paragraph 1 No. 2 of the general provisions applies similarly. In individual cases, students may apply to the Examination Committee to take the examination as a written examination in accordance with section 22 paragraph 2 of the general provisions.

(3) The following free attempt regulation applies to the modules of the first study phase: A student who has taken and passed the relevant module examination for the first time can, upon application to the Central Examination Office, repeat the module examination at the next possible examination date to improve their grade. In such cases, the better result holds.

(4) It is possible to deregister from a compulsory elective module four times and choose another elective module in accordance with the requirements of section 35. This regulation also applies if the relevant compulsory elective module has been finally failed. The deregistration must be requested in written form at the Central Examination Office.

(5) A candidate who has passed a module examination in a compulsory elective area in the second phase that is recorded as an additional achievement in accordance with section 41 can request that it is exchanged for an examination of a module from the same compulsory elective area, whether passed, not yet passed, or definitively failed (compensation).

Section 44 Transitional provisions

(1) These special provisions apply to all students who are enrolled for the first time in the bachelor's degree program in Computer Engineering at the Faculty of Computer Science, Electrical Engineering and Mathematics from the winter semester 2024/25 onwards.

(2) Students who were already enrolled before the winter semester 2024/25 will take their bachelor's examination, including repeat examinations, in accordance with the examination regulations in the version dated 16 June 2017 (AM.Uni.Pb. 56.17), last amended by the statutes dated 29 April 2019 (AM.Uni.Pb. 17.19). Students can apply to the Central Examination Office to be transferred to these special provisions. The application is irrevocable. Students who do not switch to these special provisions can take their bachelor's examination, including repeat examinations, for the last time in the summer semester 2028 in accordance with the examination regulations in the version dated 16 June 2017 (AM.Uni.Pb. 56.17), last amended by the statutes dated 29 April 2019 (AM.Uni.Pb. 17.19). The bachelor's examination, including repeat examinations, is thereafter taken in accordance with these special provisions.

Section 45 Enactment and publication

(1) These special provisions come into legal effect on 1 October 2024. At the same time, the regulations for the master's degree program Computer Engineering from 16 June 2017 (AM.Uni.Pb. 56.17), last amended by the statutes dated 29 April 2019 (AM.Uni.Pb. 17.19), shall expire. Section 44 remains unaffected.

(2) These special provisions are published in the Official Notices of Paderborn University (AM.Uni.Pb.).

(3) Pursuant to section 12 paragraph 5 HG, a violation of procedural or formal provisions of HG or the university's regulatory or other autonomous law can no longer be asserted against these regulations after the expiry of one year since the publication of these regulations, unless

1. the regulations have not been duly published,
2. the Executive Board has previously objected to the resolution of the body adopting the regulations,
3. the formal or procedural defect has been notified to the university in advance, specifying the legal provision violated and the fact that reveals the defect, or
4. the legal consequence of the exclusion of objection was not pointed out in the public announcement of the regulations.

(4) The first amendment to these provision comes into force on 1 October 2024.

Issued on the basis of the resolution of the Faculty Council of the Faculty of Computer Science, Electrical Engineering and Mathematics of May 22, 2023, and after examination of legality by the Presidium of Paderborn University on July 12, 2023.

This is a special version made easier to read by including the amendments (see the cover page for the amendment numbers). This special version is not an official notice and is thus not the basis for any legal claims.

Appendices

Appendix I: Exemplary study plan

The following diagram shows a typical study plan for the bachelor's degree programme in Computer Engineering, showing the modules and credit points (CP) per module. The workload for the associated courses is given in hours (h).

1st semester 30 CP	Höhere Mathematik I 16 CP Höhere Math. A 240h	Grundlagen der Elektrotechnik A 8 CP / 240h		Programmierung I 8 CP / 240h	Modellierung 6 CP / 180h	
2nd semester 30 CP	Höhere Math. B 240h	Grundlagen der Elektrotechnik B 8 CP / 240h		Programmierung II 8 CP / 240h	Digitaltechnik 6 CP / 180h	
3rd semester 30 CP		Halbleiter-bauelemente für Computer Engineering 5 CP / 150h	Grundlagen des VLSI-Entwurfs 5 CP / 150h	Datenstrukturen und Algorithmen 8 CP / 240h	Rechner-architektur 6 CP / 180h	Praktikum Mikro-controller und Interface-Elektronik 6 CP / 180h
4th semester 30 CP	Stochastik für Ingenieure 5 CP / 150h	Signaltheorie 5 CP / 150h	System-theorie 5 CP / 150h	Betriebssysteme 6 CP / 180h	Proseminar 4 CP / 120h	Gesellschaft und Informations-technik 5 CP / 150h
5th semester 30 CP	Compulsory elective module 6 CP / 180h	Signal- und Informations-übertragung 5 CP / 150h	Einführung in Data Science 5 CP / 150h	Rechnernetze 5 CP / 150h	Systementwurf-Teamprojekt 6 CP / 180h	Abschlussarbeit 15 CP Thesis plan 90h
5th semester 30 CP	Compulsory elective module 6 CP / 180h	Compulsory elective module 6 CP / 180h	Compulsory elective module 6 CP / 180h			Bachelor's thesis 360h

Appendix II: Module list

The following list of compulsory and elective modules from the bachelor's programme Computer Engineering also details the number and type of examinations. The admission requirements for the final module examinations (study achievements, qualified participation) can be found in the module handbook.

As a result of the ongoing development of research and teaching of the Institutes of Computer Science and Electrical Engineering and Information Technology, a small number of modules from the following list may be omitted from the elective area or replaced or supplemented by a small number of modules that belong to the same subject area. The changes will be announced in the module handbook. The regulations on study achievements, scope and admission requirements remain unaffected by this.

Module Course (CS)	Module CP / CS workload	Number and type of exams	Notes
Höhere Mathematik I	16 CP	1 oral or written exam as final module examination	Compulsory module Qualified participation in accordance with section 15 paragraph 3 is required for the courses “Höhere Mathematik A” and “Höhere Mathematik B” for participation in the final module examination. The specific form of assessment can be found in the module handbook.
Höhere Mathematik A	240h		
Höhere Mathematik B	240h		
Stochastik für Ingenieure	5 CP / 150h	1 written exam as final module examination	Compulsory module
Grundlagen der Elektrotechnik A	8 CP / 240h	1 written exam as final module examination	Compulsory module
Grundlagen der Elektrotechnik B	8 CP / 240h	1 written exam as final module examination Exercises or short written exam as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.

Module Course (CS)	Module CP / CS workload	Number and type of exams	Notes
Halbleiterbauelemente für Computer Engineering	5 CP / 150h	1 written exam as final module examination Exercises or short written exam as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.
Grundlagen des VLSI-Entwurfs	5 CP / 150h	1 written or oral exam as final module examination	Compulsory module
Signaltheorie	5 CP / 150h	1 written exam as final module examination	Compulsory module
Systemtheorie	5 CP / 150h	1 written exam as final module examination	Compulsory module
Programmierung I	8 CP / 240h	1 written exam as final module examination Exercises or short written exam as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.
Programmierung II	8 CP / 240h	1 written exam as final module examination Exercises or short written exam as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.
Modellierung	6 CP / 180h	1 written exam as final module examination Exercises as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.

Module Course (CS)	Module CP / CS workload	Number and type of exams	Notes
Datenstrukturen und Algorithmen	8 CP / 240h	1 written exam as final module examination Exercises as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.
Digitaltechnik	6 CP / 180h	1 written exam as final module examination	Compulsory module
Rechnerarchitektur	6 CP / 180h	1 written exam as final module examination	Compulsory module
Praktikum Mikrocontroller und Interface- Elektronik	6 CP / 180h	1 project	Compulsory module
Betriebssysteme	6 CP / 180h	1 written exam as final module examination	Compulsory module
Rechnernetze	5 CP / 150h	1 written exam as final module examination	Compulsory module
Systementwurf-Teamprojekt	6 CP / 180h	Project work	Compulsory module
Signal- und Informationsübertragung	5 CP / 150h	1 written or oral exam as final module examination	Compulsory module
Einführung in Data Science	5 CP / 150h	1 written exam as final module examination Exercises as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.

Module Course (CS)	Module CP / CS workload	Number and type of exams	Notes
Compulsory elective area Electrical Engineering			
Compulsory elective module 1	6 CP / 180h	1 written or oral exam as final module examination	1 compulsory elective module is selected from the Electrical Engineering catalogue below
Compulsory elective module 2	6 CP / 180h	1 written or oral exam as final module examination	1 compulsory elective module is selected from the Electrical Engineering catalogue below
Compulsory elective area Computer Science			
Compulsory elective module 1	6 CP / 180h	1 written or oral exam as final module examination	1 compulsory elective module is selected from the Computer Science catalogue below The module must be from the computer science area “Computer Systems”.
Compulsory elective module 2	6 CP / 180h	1 written exam or 1 oral exam as final module examination	1 compulsory elective module is selected from the Computer Science catalogue below
Gesellschaft und Informationstechnik	5 CP / 150h	1 oral or written exam Exercises as a study achievement	Compulsory module The study achievement must be passed to participate in the final module examination.
Proseminar	4 CP / 120h	1 written paper with academic talk	Compulsory module
Abschlussarbeit	15 CP	see section 40	Compulsory module Students must have completed
Thesis plan	90h		

Module Course (CS)	Module CP / CS workload	Number and type of exams	Notes
Bachelor's thesis	360h		the first study phase to be admitted to the module Abschlussarbeit (section 35 paragraph 2). To be able to complete the module and gain the credit points, qualified participation must be shown by completing the thesis plan.

Module catalogue for the compulsory elective area Electrical Engineering

Aktuelle Themen der Signalverarbeitung
Einführung in die Hochfrequenztechnik
Elektrische Antriebstechnik
Energieeffizienz in der Industrie
Energietechnik
Elektromagnetische Feldtheorie
Höhere Mathematik C für Computer Engineering
Industrielle Messtechnik
Messtechnik
Messtechnische Signalanalyse in Python
Numerische Verfahren für Ingenieure
Optische Informationsübertragung
Qualitätssicherung für Mikroelektronische Systeme
Regelungstechnik
Regenerative Energien
Speicherprogrammierbare Steuerungen (SPS)
Zeitdiskrete Signalverarbeitung

Module catalogue for the compulsory elective area Computer Science

One compulsory elective module must be selected from the area “Computer Systems”.

Area “Computer Systems”

Einführung in Hochleistungsrechnen
Eingebettete Systeme

Other areas

Angriffssicherer Softwareentwurf
Berechenbarkeit und Komplexität
Databases and Information Systems
Datenbanken
Einführung in Kryptographie
Foundations of the Semantic Web
Grundlagen der Algorithmischen Geometrie
Grundlegende Algorithmen
IT Sicherheit
Software Engineering
Systems Engineering
Verteilte Algorithmen und Datenstrukturen

Appendix III: Module descriptions

The current module handbooks can be found here:
https://ei.uni-paderborn.de/studium/formalitaeten/ordnungen