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

from 24 May 2024 (Official Notices 38.24)
as amended in the Official Notices 54.24 from 30 September 2024

Version CEMA v4

(As of: 27 August 2026)

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. 1278):

This is a translation of the “Besondere Bestimmungen der Prüfungsordnung für den Masterstudiengang 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.

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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 of the examination regulations for master'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 master's degree programme Computer Engineering expands on the knowledge and skills acquired in the bachelor's degree programme in Computer Engineering or a comparable degree programme and provides an academically sound education at the interface between electrical engineering and computer science. It qualifies students both for a doctoral programme and for professional work in the areas design engineering, manufacturing, operation and analysis of computer systems, and in the technical applications of computer systems.

(2) Students extend and deepen the knowledge and abilities gained in their bachelor's programme. During the programme, graduates gain the following competencies in particular:

- Subject-specific competencies:

  Graduates have in-depth knowledge in the following areas:

  - networked embedded systems,
  - computer architecture,
  - statistical signal processing,
  - circuit and system design.

  Students also augment their specialist skills in one area of computer engineering and gain an overview of other areas. The areas are organised according to the professions from the fields of computer systems, communications technology, nano and microelectronics, embedded systems, microsystems technology, automation of manufacturing processes and robot engineering.

- Functional and systemic competencies:

  Graduates are able

  - to recognise, formulate and structure problems, and methodically analyse and develop solution strategies for complex tasks relating to specific content;
  - to use the subject-specific knowledge gained in practice in international interdisciplinary teams, and to organise and lead projects;
  - to take on leadership duties in demanding projects in research, development, business and administration;
  - to act responsibly with regard to the effects of technological change.

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- Communicative competencies:

  Graduates are able to communicate on technical matters both orally and in writing. In particular, they can formulate problems and their solutions in both German and English 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 master's degree programme and master's examination take place in German and English. If the master's degree programme Computer Engineering is taken completely in English, a slight restriction of choice is to be expected. The same applies if only the proportion of courses in English required in section 35 paragraph 3 is selected. In accordance with section 35 paragraph 4, the degree “English-language Master's programme in Computer Engineering” is certified on the certificate. The language of a module is given in the module description.

Section 33 Start of studies

The programme can be started in either the winter or the summer semester.

Section 34 Admission requirements

(1) In accordance with section 5 of the general provisions, the degree programme requires study components in at least the following areas, comprising at least the credits listed:

- 15 CP in mathematics;
- 30 CP in computer science, whereby the topic technical computer science must be covered;
- 30 CP in electrical engineering;
- 12 CP for an independently written thesis.

(2) The applicant is to have sound English language skills which are shown by certification of:

1. successfully completed school English from year 5 lasting at least 5 years;
2. a bachelor's degree taken in an English speaking country or in an English-language accredited institution in Germany;[1]
3. a Test of English as Foreign Language (TOEFL) as an ‘Internet-based’ Test (iBT) with a score of at least 80 points;
4. a TOEFL as a ‘paper-based’ Test (PBT) with a score of at least 550 points;
5. an IELTS test with a score of 6.5 or better;
6. a Cambridge Test Certificate in Advanced English (CAE) of grade B; or
7. an equivalent test.

[1] Countries in which English is the official language and the medium of instruction of the relevant degree programme are deemed to be English-speaking within the framework of these regulations.

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(3) Notwithstanding section 5 paragraph 1 No. 3 of the general provisions, proof of sufficient German language skills is not required.

(4) A foreign applicant who is not treated as German by or on the basis of international treaties must prove their ability to study by providing the results of a GRE Revised General Test. As a rule, at least 157 points are required in the 'Quantitative Reasoning' section and at least 3.0 points in the 'Analytical Writing' section of the GRE Revised General Test. Proof of the GRE Revised General Test is not required if the final grade of the degree in accordance with No. 2 is very good. Applicants with a German higher education entrance qualification are not required to provide proof of eligibility to study.

Section 35 Structure, course content, and modules

(1) The following compulsory modules must be completed in the master's degree programme:

1. Advanced Networked Systems (6 CP)
2. Advanced Computer Architecture (6 CP)
3. Statistical Signals (6 CP)
4. Analysis and Design of Electronic Circuits (6 CP)
5. Project Group Computer Engineering (18 CP)
6. Scientific Working (6 CP)
7. Final Degree Module (30 CP)

(2) Modules totaling 42 CP are to be completed in the compulsory elective area. The compulsory elective area is split into six focus areas:

1. Embedded Systems
2. Nano/Microelectronics
3. Computer Systems
4. Communication and Networks
5. Signal Processing
6. Control and Automation

Four compulsory elective modules of a total of 24 credit points must be chosen from one of the focus areas. In addition, three further compulsory elective modules of a total of 18 credit points from the general elective area must be completed.

(3) All students must complete modules and the examinations belonging to them for a total of at least 24 credit points in English. In the context of these regulations, this means that lectures and materials are held or available in English and that examinations are held in English.

(4) In accordance with section 32 paragraph 3 sentence 4, the certificate for the degree "English-language Master's programme in Computer Engineering" is issued if

1. the examination in accordance with paragraph 1 No. 7 (Final Degree Module) has been completed entirely in English and
2. and those pursuant to paragraph 1 No. 1 to 6 and paragraph 2, with the exception of modules and examinations amounting to a maximum of 18 credit points, and with the exception of non-English language courses in the module Scientific Working, have been completed in accordance with the form described in paragraph 3.

(5) On application and in individual cases, the Examination Committee may allow taking an elective module for another focus area if the content of the module matches the subject of the focus area.

Section 35a Compulsory counselling

At the request of the university, students are obliged to participate in a study counselling session if half of the standard period of study has expired, at the earliest three months after the end of the second semester, and they have completed examination assessments amounting to less than one third of the credit points to be achieved at the time of invitation. 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 paragraph 7 of the general provisions does not apply for the master'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) Admission to the master's thesis can only be granted to students who have achieved at least 45 credit points and, in the case of enrolment with conditions in accordance with section 5 paragraph 1 No. 2b) of the general provisions, have provided proof that they have passed the associated examinations.

(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.

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Section 39 Module assessments

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

(2) Examination assessments are provided 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 groups, 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 Master's thesis, final presentation, further concluding achievements

(1) The time allowed for the master's thesis is six months. The master's thesis should not exceed 120 DIN A4 pages. The master's thesis is written in the focus area chosen, in accordance with section 35 paragraph 2.

(2) The module Final Degree Module consists of the thesis plan (qualified participation, workload 150 hours, determined by the first examiner) and the master's thesis including an interim presentation and a final presentation (workload 750 hours).

(3) As a rule, four weeks after the announcement of the topic, the candidate presents the procedure and schedule for the master's thesis in an interim presentation (approx. 30-40 minutes). As a rule, the topic and the results of the master's thesis must be presented in a final oral presentation (approx. 45-60 minutes) four weeks after submission of the master's thesis. The final presentation is counted as part of the master’s thesis for the purpose of its evaluation.

(4) The topic of the master's thesis can be returned once within two weeks of the start of the period allowed for the thesis. The time allowed for the thesis restarts with the assignment of the new topic. In contrast to section 17 paragraph 7 of the general provisions, the Examination Committee may, in

individual cases, extend the completion time by up to six weeks upon justified request, which must be submitted to the Examination Committee at least one week before the submission deadline, if the reasons for this are related to the topic of the thesis and the responsible supervisor supports this.

Section 41 Additional modules

Students can partake in additional achievements for up to 24 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 Project Group is given a 1/2 weighting and the Final Degree Module a 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 three.

(2) Contrary to section 22 paragraph 2 of the general provisions, the final attempt of 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) A candidate who has passed a module examination in a compulsory elective area or focus area 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). Compensation is possible in the focus area chosen for two modules within this focus area and in the remaining compulsory elective area for any two modules.

(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.

Section 44 Transitional provisions

(1) These special provisions apply to all students who are enrolled for the first time in the master's degree programme 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 master's examination, including repeat examinations, in accordance with the examination regulations in the version dated 16 June 2017 (AM.Uni.Pb. 57.17), amended by the statutes from 29 April 2019 (AM.Uni.Pb. 18.19). 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 master's examination, including repeat examinations, for the last time in the winter semester 2026/27 in accordance with the examination regulations in the version dated 16 June 2017 (AM.Uni.Pb.. 57.17), last amended by the statutes dated 29 April 2019 (AM.Uni.Pb. 18.19). The master'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 from 16 June 2017 (AM.Uni.Pb. 57.17), amended by the statutes from 29 April 2019 (AM.Uni.Pb. 18.19), 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 provisions comes into force on 1 October 2024.

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Appendices

Appendix I: Exemplary study plan

The following diagram shows a typical study plan for the master'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).

<table>
<tr><td>1st semester
30 CP</td><td>Compulsory module
Statistical Signals
6 CP / 180h</td><td>Compulsory module
Analysis and Design of Electronic Circuits
6 CP / 180h</td><td>Compulsory module
Advanced Computer Architecture
6 CP / 180h</td><td>Further elective module
Module 1
6 CP / 180h</td><td>Focus area
Module 1
6 CP / 180h</td><td></td></tr>
<tr><td rowspan="2">2nd semester
30 CP</td><td colspan="2">Scientific Working
6 CP</td><td rowspan="2">Compulsory module
Advanced Networked Systems
6 CP / 180h</td><td rowspan="2">Focus area
Module 2
6 CP / 180h</td><td rowspan="2">Focus area
Module 3
6 CP / 180h</td><td rowspan="3">Project Group
Computer Engineering
18 CP / 540h</td></tr>
<tr><td>Seminar
120h</td><td>Languages, Writing and Presentation Techniques
60h</td></tr>
<tr><td>3rd semester
30 CP</td><td></td><td></td><td>Further compulsory elective
Module 2
6 CP / 180h</td><td>Further compulsory elective
Module 3
6 CP / 180h</td><td>Focus area
Module 4
6 CP / 180h</td></tr>
<tr><td rowspan="2">4th semester
30 CP</td><td colspan="2">Final Degree Module
30 CP</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>Thesis plan
150h</td><td>Master's thesis
750h</td></tr>
</table>

Focus areas:

- Embedded Systems
- Nano/Microelectronics
- Computer Systems
- Communication and Networks
- Signal Processing
- Control and Automation

Further compulsory elective modules:

Modules can be chosen from the general compulsory elective area

Master's Project:

Topic of the master's thesis from the focus area

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Appendix II: Module list

The following list of compulsory and compulsory elective modules from the master'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)**	**CP / h**	**Number and type of exams**	**Notes**
Advanced Networked Systems	6 CP / 180h	1 oral or written exam as final module examination	Compulsory module in computer science
Advanced Computer Architecture	6 CP / 180h	1 oral or written exam as final module examination	Compulsory module in computer science
Statistical Signals	6 CP / 180h	1 oral or written exam as final module examination	Compulsory module in electrical engineering
Analysis and Design of Electronic Circuits	6 CP / 180h	1 oral or written exam as final module examination	Compulsory module in electrical engineering
Scientific Working	6 CP / 180h	1 written paper with academic talk in the seminar	Compulsory module Qualified participation in Languages, Writing and Presentation Techniques is required to complete the module and obtain the credit points. The specific form of assessment can be found in the module handbook.
Seminar	120h		
Languages, Writing and Presentation Techniques	60h		
4 compulsory elective modules from the focus area	24 CP / 720h	1 oral or written exam, or written paper with academic talk per module	
Selection from the focus area			

Module Course (CS)	CP / h	Number and type of exams	Notes
3 further compulsory elective modules	18 CP / 540h	1 oral or written exam, or written paper with academic talk per module	
Any selection from the general elective area			
Project Group Computer Engineering	18 CP / 540h	Project work Progress report or written paper with academic talk as a study achievement	The study achievement must be passed to participate in the final module examination.
Final Degree Module	30 CP / 900h		To be able to complete the module and gain the credit points, qualified participation must be shown by completing the thesis plan. Students must have completed modules for a total of 45 credit points to be admitted to the Final Degree Module. The master's thesis must be in the focus area.
Thesis plan	150h		
Master's thesis	750h		

Courses in the area languages, writing and presentation techniques

Students must choose a course from the range of courses offered by Paderborn University in the areas of foreign languages, writing academic texts and presentation techniques. The courses on offer are listed in the Paderborn University course catalogue. The aim of this elective course is to broaden and deepen interdisciplinary qualifications.

List of focus areas and their modules

The following focus areas and the modules they contain are listed in alphabetical order.

Focus area "Communication and Networks"

Advanced Distributed Algorithms and Data Structures
Integrierte Schaltungen für die drahtlose Kommunikation
Optical Communication A
Optical Communication B
Optical Communication C
Optimale und Adaptive Filter
Schnelle integrierte Schaltungen für die leitungsgebundene Kommunikation
Topics in Signal Processing
Web Security
Wireless Communications

Focus area "Computer Systems"

Algorithms and Tools for Test and Diagnosis of Systems on a Chip
Introduction to Quantum Computation
Reconfigurable Computing
VLSI Testing

Focus area "Control and Automation"

Advanced Control
Advanced System Theory
Advanced Topics in Robotics
Gekoppelte Felder
Geregelte Drehstromantriebe
Reinforcement Learning
Robotics
Ultraschallmesstechnik
Umweltmesstechnik

Focus area "Embedded Systems"

Advanced VLSI Design
Algorithms and Tools for Test and Diagnosis of Systems on a Chip
Integrierte Schaltungen für die drahtlose Kommunikation
Model-Based Systems Engineering
Reconfigurable Computing
Schnelle integrierte Schaltungen für die leitungsgebundene Kommunikation
VLSI Testing

Focus area "Nano/Microelectronics"

Advanced VLSI Design

Algorithms and Tools for Test and Diagnosis of Systems on a Chip
Einführung in die Hochfrequenztechnik
High Frequency Engineering
Integrierte Schaltungen für die drahtlose Kommunikation
Schnelle integrierte Schaltungen für die leitungsgebundene Kommunikation
VLSI Testing

Focus area "Signal Processing"

Advanced System Theory
Digital Image Processing I
Digital Image Processing II
Digitale Sprachsignalverarbeitung
Integrierte Schaltungen für die drahtlose Kommunikation
Optimale und Adaptive Filter
Schnelle integrierte Schaltungen für die leitungsgebundene Kommunikation
Statistical and Machine Learning
Technische kognitive Systeme – Ausgewählte Kapitel
Topics in Pattern Recognition and Machine Learning
Topics in Signal Processing
Wireless Communications

General elective area

Students can choose from any of the following courses in electrical engineering and computer science:

Electrical engineering "Energie und Umwelt"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Antriebe für umweltfreundliche Fahrzeuge
Bauelemente der Leistungselektronik
Circular Economy and Energy
Datengetriebenes Ressourcenmanagement
Design of Energy Transition Scenarios
Energiesystemtechnik
Energy Transition
Intelligent Control of Electricity Grids
Leistungselektronik
Leistungselektronik für die Energiewende
Leistungselektronische Stromversorgungen
Mensch-Haus-Umwelt
Modellierung von Energiesystemen
Solar Electric Energy Systems
Umweltmesstechnik

Electrical engineering "Kognitive Systeme"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced Topics in Robotics
Digital Image Processing I
Digital Image Processing II
Reinforcement Learning
Robotics
Statistical and Machine Learning
Technische kognitive Systeme – Ausgewählte Kapitel
Topics in Pattern Recognition and Machine Learning

Electrical engineering "Kommunikationstechnik"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Ausgewählte Kapitel der Theoretischen Elektrotechnik
Digitale Sprachsignalverarbeitung
Elektromagnetische Feldsimulation
Feldberechnung mit der Randelementmethode
Hochfrequenztechnik
Numerische Simulation mit der Discontinuous Galerkin Time Domain Methode
Optical Waveguide Theory
Optimale und adaptive Filter
Topics in Signal Processing
Wireless Communications

Electrical engineering "Mikroelektronik"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced VLSI Design
Algorithms and Tools for Test and Diagnosis of Systems on Chip
Analoge CMOS-Schaltkreise
Hochfrequenzleistungsverstärker
Integrierte Schaltungen für die drahtlose Kommunikation
Schnelle integrierte Schaltungen für die leitungsgebundene Kommunikationstechnik
Theorie und Anwendung von Phasenregelkreisen (PLL-System)
VLSI Testing

Electrical engineering "Optoelektronik"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Hochfrequenzelektronik
Optical Communication A
Optical Communication B
Optical Communication C
Optical Communication D

Electrical engineering "Prozessdynamik"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced Complexity Theory
Advanced Control
Advanced System Theory
Gekoppelte Felder
Geregelte Drehstromantriebe
Technische Akustik
Topics in Advanced Control
Ultraschallmesstechnik

Computer science focus area "Classical and Quantum Algorithm Design"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced Algorithms
Advanced Distributed Algorithms and Data Structures
Algorithms for Complex Virtual Scenes
Foundations of Cryptography
Introduction to Quantum Computation
Post-Quantum Cryptography
Quantum Algorithms
Quantum Complexity Theory
Quantum Information

Computer science focus area "Computer and Communication Systems"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced Distributed Algorithms and Data Structures
Reconfigurable Computing

Computer science focus area "Data Science and Intelligent Systems"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced Algorithms
Advanced Distributed Algorithms and Data Structures
Data Science for Software Engineering
Data Science in Industrial Applications
Explainable Artificial Intelligence
Foundations of Knowledge Graphs
Machine Learning for Biometrics
Multi-Objective Optimisation
Unsupervised Learning and Evolutionary Optimisation Using R

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Computer science focus area "Security"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Advanced Distributed Algorithms and Data Structures
Designing code analyses for large-scale software systems 1
Designing code analyses for large-scale software systems 2
Foundations of Cryptography
Human Factors in Security and Privacy
Introduction to Quantum Computation
Machine Learning for Biometrics
Privacy and Technology
Post-Quantum Cryptography
Quantum Complexity Theory
Real World Crypto Engineering
Usable Security and Privacy
Web Security

Computer science focus area "Software Engineering"

(6 CP per module, 1 written exam, 1 oral exam, or 1 written paper with academic talk per module)

Concepts of Computer Science
Data-Driven Engineering
Data-Driven Innovation
Data Science for Software Engineering
Data Science in Industrial Applications
Designing code analyses for large-scale software systems 1
Designing code analyses for large-scale software systems 2
Human Factors in Security and Privacy
Model-Based Systems Engineering
Software Architecture Design and Recovery

Appendix III: Module descriptions

The current module handbooks can be found here:
https://ei.uni-paderborn.de/en/studies/formalities/examination-regulations-and-module-manuals

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