Course of Study-Specific Examination Regulations

for the Master’s Course of Study in

Computer Science

at RWTH Aachen University

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Published as a Complete Version

(Examination Regulations – 2023 Version)

Please note: This document is merely an English translation. Only the German original of these regulations as published in the Official Announcements of RWTH Aachen University (“Amtliche Bekanntmachungen”) is legally binding.

Based on §§ 2 (4) and 64 of the Higher Education Act of the State of North Rhine-Westphalia (Hochschulgesetz – HG) in the version of the announcement dated September 16, 2014 (Law and Official Gazette of the State of North Rhine-Westphalia p. 547), most recently amended by Article 1 of the Act on Membership of University Hospitals in the Employers’ Association of North Rhine-Westphalia, dated June 30, 2022 (GV. NRW p.780b), RWTH Aachen University (RWTH) has issued the following regulations:
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I. General

§ 1
Scope of Application and Academic Degree

(1) These regulations apply to the master’s course of study in Computer Science at RWTH. They only apply in conjunction with the currently valid version of the General Examination Regulations (GER), supplementing it with additional course-specific regulations. In cases of doubt, the provisions of the General Examination Regulations take precedence.

(2) Students who successfully complete the master’s course of study are awarded the academic degree of Master of Science RWTH Aachen University (M. Sc. RWTH) by the Faculty of Mathematics, Computer Science and Natural Sciences.

§ 2
Objectives of the Course of Study and Language Provisions

(1) This master's degree program builds upon the bachelor's degree program in Computer Science in accordance with § 2 (3) GER.

(2) The overall educational objectives are set out in § 2 (1, 3, and 4) GER.

(3) The course of study is taught in German and English.

(4) Exams may be taken in German or English, in agreement with the examiner in question.

§ 3
Admission Requirements

(1) A recognized first university degree according to § 3 (4) GER is required to be eligible for admission.

(2) To meet the subject-specific requirements allowing the applicant to successfully complete the master’s course of study in Computer Science, they must have the necessary knowledge and skills evidenced by credit points (CP) in the following areas:

1. Skills in the field of practical computer science amounting to 33 CP:
   a. Programming skills, 8 CP
   b. Data Structures and Algorithms, 7 CP
   c. Databases and Information Systems, 6 CP
   d. Introduction to Software Technology, 6 CP
   e. Elements of Machine Learning and Data Science, 6 CP

2. Skills in the field of computer engineering amounting to 28 CP:
   a. Introduction to Computer Engineering, 6 CP
   b. Operating Systems and System Software, 6 CP
c. Data Communication, 6 CP  

d. Systems Programming, 6 CP  

e. IT Security, 4 CP  

3. Skills in theoretical computer science amounting to 24 CP:  
a. Formal Systems, Automata and Processes, 6 CP  
b. Computability and Complexity, 6 CP  
c. Mathematical Logic, 6 CP  
d. One of the following core electives from the core electives section of the Computer Science bachelor’s program  

• Efficient Algorithms, 6 CP  
• Model Checking, 6 CP  
• Compiler Construction, 6 CP  
• Foundations of Functional Programming, 6 CP  
• Foundations of Logic Programming, 6 CP  
• Satisfiability Checking, 6 CP  
• Modeling and Analysis of Hybrid Systems, 6 CP  
• Complexity Theory, 6 CP  
• Mathematical Logic II, 6 CP  
• Advanced Automata Theory, 6 CP  

4. Skills in mathematics amounting to 26 CP:  
a. Discrete Structures  
b. Analysis for Computer Scientists, 8 CP  
c. Linear Algebra, 6 CP  
d. Introduction to Applied Stochastics, 6 CP  

5. One core elective from the electives section of the Computer Science bachelor’s program worth 6 CP.  

The credit points must have been earned for assessments comparable to those required by the Computer Science bachelor’s degree program at RWTH.  

(3) In addition, proof of the Graduate Record Examination (GRE) General Test is required at the time of application. In the Quantitative Reasoning (GRE-QR) measure, applicants must be among the top 25% (above the 75th percentile) and in the Verbal Reasoning (GRE-VR) measure, among the top 85% (above the 15th percentile) of a test cohort. A minimum score of 3.5 must be achieved in the Analytical Writing (GRE-AW) measure. Applicants who are citizens of a member state of the European Union or of the European Economic Area (EEA) as well as “Bildungsinländerinnen” or “Bildungsinländer”, i.e., non-German citizens who have a German school leaving certificate or university degree are exempt from this rule.  

(4) For admission conditional on the completion of additional requirements, § 3 (6) GER applies. If additional requirements corresponding to more than 42 credit points are imposed, admission to the master’s course of study will be denied.  

(5) For this master’s course of study, students must prove they are proficient in German and English according to § 3 (7) or § 3 (9) GER, respectively. Evidence of English language proficiency
may also be provided by submitting a seminar paper or bachelor’s thesis written in English to the Examination Board.

(6) When determining whether the admission requirements are met, § 3 (12) ÜPO applies.

(7) General regulations for the recognition of prior exams and assessments are stipulated in § 13 GER.

§ 4
Standard Period of Study, Curriculum, Credit Points, and Degree Components

(1) The standard period of study, including the completion of the master's thesis, is four semesters (two years) full-time. Students can start their studies in either semester – winter or summer.

(2) The program consists of six core electives (one in a field of application), a computer science seminar, a computer science lab course, and a focus colloquium. The core elective section is a combination of the computer science core electives catalog (58-66 CP) and modules from the core electives catalog of the field of application (10-18 CP). In the field of application, modules from other departments, as defined in the module handbook, are offered. For successful completion of the degree program, a total of 120 credit points must be earned. The master's program of study is comprised of the following components:

1. Modules from the computer science core electives catalog amounting to 58 to 66 CP
2. One computer science seminar, 4 CP
3. A computer science lab course, 7 CP
4. An oral focus colloquium in computer science, 3 CP
5. Modules from the field of application’s core electives catalog amounting to 10 to 18 CP
Total: 120 CP

The modules from the computer science core electives catalog are divided into five thematic sections:

1. Theoretical Computer Science
2. Visual Computing and Interaction
3. Hardware / Software Systems
4. AI & Data
5. Software Development – Methods and Tools

The assignment of the modules to the thematic sections is specified in the module handbook. Students must earn at least 12 CP in at least three of these sections. One of these sections must be Theoretical Computer Science.

(3) The degree program comprises at least 14 and not more than 24 modules, including the master’s thesis module. All modules are specified in the module handbook. The assignments or exams in the individual modules are weighted with credit points according to § 4 (4) GER.
§ 5

Obligatory Attendance in Classes

(1) According to § 5 (2) GER, obligatory attendance can only be stipulated in the following course types:

1. Tutorials
2. Seminars and introductory seminars
3. Colloquia
4. Lab courses and internships
5. Excursions

(2) Classes for which attendance is required in accordance with paragraph 1 shall be identified as such in the module catalog.

§ 6

Policies Governing Exams and Assignments

(1) General regulations governing exams and assignments are defined in § 6 GER.

(2) If successful completion of modules, exams, or module components according to § 5 (4) GER is stipulated as a precondition for participation in other exams and assignments, this is indicated in the module handbook.

§ 7

Types of Exams and Assignments

(1) General regulations governing types of exams and assignments are defined in § 7 GER.

(2) The following additional forms of exams or assignments are a required degree component in line with § 7 (1) GER:

- The **focus colloquium** is a cumulative oral exam on all course content from at least three modules worth 12 to 18 CP combined. The provisions for oral exams according to § 7 (6) GER furthermore apply. The colloquium shall last at least 20 and not more than 45 minutes. The modules should be closely related in content. Students may also have to complete additional exams or assignments on them as part of their core elective section. In the focus colloquium, the student should demonstrate that they can grasp a larger subject area as a whole, identify connections between topics, and link results from different areas with one another. The student can be tested by one or more examiners, of which at least one examiner must be a member of the Computer Science Department. The examiners are responsible for deciding which modules can be tested together as part of the focus colloquium.

(3) Written exams shall be scheduled to last at least 60 and at most 120 minutes; in applied subjects, written exams can last up to 150 minutes.

(4) Oral exams shall last at least 15 minutes and at most 30 minutes per candidate. An oral exam may be carried out as a group exam with up to four candidates.

(5) The following applies to seminar papers and research papers: Depending on the topic, the paper shall range between 5 and 20 pages. As a rule, the paper is to be completed over the semester and involves giving a final oral presentation.
(6) Term papers shall range from 5 to 40 pages. Students are typically given from one week to
three months to complete a term paper.

(7) A paper on the topic of an oral presentation shall not exceed 40 pages. The presentation shall
last at least 10 minutes and not more than 60 minutes.

(8) The following applies specifically to colloquia: a colloquium shall last at least 15 minutes and
not more than 45 minutes.

(9) The following applies to Computer Science internships: Students are expected to inde-
pendently apply subject-specific knowledge and methods to to design, implement, and test
software and hardware systems and to carry out experiments and measurements. Usually, an
assignment is completed in small groups in order to train the students' ability to work in a team.
For internships/lab courses from the application subjects, please refer to § 7 (14) GER.

(10) Instructors will specify at the beginning of their courses, how long students will have to com-
plete the associated exam or assignment.

(11) Admission to module exams may be conditional on the successful completion of module com-
ponents as examination requirements in accordance with § 7 (15) GER. For the relevant mod-
ules, this is outlined in the module handbook. At the start of the semester, or by the first session
of the course, the instructor shall provide their students with precise criteria online regarding
opportunities to improve their grades by completing module components, specifically indicating
the number and type of tutorials that can be taken for extra credit and the methods of correction
and assessment.

§ 8 
Assessment and Grading

(1) For general regulations on the assessment of exams and the grading process, please refer to
§10 GER.

(2) If an exam or assignment consists of several components, each component must be passed,
 i.e., be completed at least with the grade "sufficient" (4.0).

(3) A module has been passed if all associated assignments and exams have been passed with
 a grade of at least "sufficient" (4.0), and all other credit points earned, or module components
 completed according to the relevant course of study-specific examination regulations.

(4) The overall grade is formed from the module grades and the grade of the master’s thesis in
 accordance with § 10 (10) GER. The oral focus colloquium (§ 4 (2)) counts toward the final
 grade with four times the value of its credit points.

(5) If all module exams of the master’s degree program have been completed within the standard
 period of study, one weighted module grade worth no more than 15 CP can be deleted. The
 grade earned in the focus colloquium cannot be dropped.

§ 9 
Examination Board

The responsible examination board according to § 11 GER is the Examination Board for Computer
Science at the Faculty of Mathematics, Computer Science and Natural Sciences.
§ 10
Repeat Attempts at Exams, Assignments, or the Master’s Thesis, and Losing the Right to Take Assessments

(1) General regulations governing retaking exams, redoing assignments or submitting a second master’s thesis, and losing the right to take exams or complete assignments are stipulated in § 14 GER.

(2) Modules that can be freely selected within a specialization of this master’s program can be substituted, provided this is permitted according to the module handbook.

§ 11
Withdrawal from Exams or Assignments, Unjustified Absence or Unfinished Work, and Academic and Other Forms of Misconduct

(1) General provisions on deregistering or withdrawing from exams or assignments, unjustified absence, failing to submit required work, violating academic integrity, or committing other infractions against the rules are stipulated in § 15 GER.

(2) The following applies to deregistering from computer science internships/lab courses and seminars: Deregistration is possible until three weeks after the topic assignment or preliminary meeting.

II. Master’s Degree Requirements and Master’s Thesis

§ 12
Master’s Degree Requirements

(1) Candidates receive a master’s degree after completing:

   1. all exams and assignments as per the degree components listed under § 4 (2) and described in more detail in the module handbook, and

   2. original work reported in a master’s thesis and master’s final colloquium.

(2) The order in which students shall take the courses is based on the curriculum included as an appendix. The master’s thesis can only be registered once the student has attained 60 credit points.

§ 13
Master’s Thesis

(1) General provisions for the master’s thesis are stipulated in § 17 GER.

(2) Further details regarding the supervision of the master’s thesis are outlined in § 17 (2) GER.

(3) This thesis can be written in German or English, in agreement with the examiner in question.
The write-up period for the master’s thesis is usually up to six months at maximum alongside studies. In justified exceptional cases, the write-up period can be extended by a maximum of up to six weeks upon application to the examination board in accordance with § 17 (7) GER. The thesis should not exceed 80 pages (excluding appendices).

The candidate presents the results of their master’s thesis in a master’s final colloquium – § 7 (12) GER in connection with § 7 (8) apply accordingly. The master’s final colloquium may be held before the master’s thesis is submitted.

The work required for preparing and writing the master’s thesis, including the colloquium, shall correspond to 30 credit points.

§ 14
Acceptance and Assessment of the Master’s Thesis

(1) General provisions on the acceptance and assessment of the master’s thesis are stipulated in § 18 GER.

(2) The master’s thesis must be submitted in electronic form by the set deadline. Detailed information is provided at https://sc.informatik.rwth-aachen.de/abschlussarbeiten.

III. Final Provisions

§ 15
Exam Viewing

The viewing shall be carried out in accordance with § 22 GER.

§ 16

(1) These examination regulations are published in the official announcements of RWTH Aachen University (“Amtliche Bekanntmachungen”) and come into effect the day after publication.

(2) These examination regulations apply to all students enrolled in the Computer Science master’s course of study at RWTH for the first time in or after the 2023/2024 winter semester.

(3) Students who enrolled in the master’s course of study before the 2023/2024 winter semester in may apply to transfer to the present examination regulations. Students can no longer pursue their studies based on the latest updated version of the examination regulations from December 16, 2015, after the 2025/26 winter semester. After the 2025/26 winter semester has concluded (March 31, 2026), students must transfer to the present version of the examination regulations.

(4) Students will receive credit for credit points they earned during studies based on the latest valid version of the examination regulations originally published December 16, 2015, according to the Equivalence List in Appendix 2 if they fulfill the requirements of the present examination regulations.
Issued based on the resolutions of the Faculty Council of the Faculty of Mathematics, Computer Science and Natural Sciences from July 5, 2023 and the emergency resolution of the Dean of the Faculty of Mathematics, Computer Science and Natural Sciences from November 28, 2022.

It is pointed out that, in accordance with § 12 (5) NRW HG, any claims regarding a violation of procedural or formal requirements of the regulatory or other autonomous rights of the University may no longer be asserted after one year has elapsed since the official publication of this announcement unless:

1) the announcement has not been properly published,
2) the Rectorate has objected, prior to publication, to the decision of the committee adopting the regulations,
3) the University has been previously notified about the defect of form or procedure in a complaint, specifying the infringed legal provision and the fact that gives rise to the defect, or
4) the legal consequence of the exclusion of complaints was not pointed out in the public announcement.

The Rector
of RWTH Aachen University

Aachen, dated July 20, 2023,

sgd. Rüdiger

Univ.-Prof. Dr. rer. nat. Dr. h. c. mult. Rüdiger
## Appendix 1: Curriculum

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>CP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Semester (WS)</strong></td>
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<tr>
<td>Computer Science (Theoretical Computer Science) core elective section</td>
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<tr>
<td>Computer Science(1) core elective section</td>
<td>18</td>
</tr>
<tr>
<td>Field of application(2)</td>
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<tr>
<td><strong>Σ</strong></td>
<td><strong>30</strong></td>
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<tr>
<td><strong>2nd Semester (SS)</strong></td>
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</tr>
<tr>
<td>Seminar</td>
<td>4</td>
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<tr>
<td>Computer Science (Theoretical Computer Science) core elective section</td>
<td>6</td>
</tr>
<tr>
<td>Computer Science(1) core elective section</td>
<td>12</td>
</tr>
<tr>
<td>Field of application(2)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Σ</strong></td>
<td><strong>28</strong></td>
</tr>
<tr>
<td><strong>3rd Semester (WS)</strong></td>
<td></td>
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<tr>
<td>Internship</td>
<td>7</td>
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<tr>
<td>Computer Science(1) core elective section</td>
<td>18</td>
</tr>
<tr>
<td>Field of application(2)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Σ</strong></td>
<td><strong>29</strong></td>
</tr>
<tr>
<td><strong>4th Semester (SS)</strong></td>
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<tr>
<td>Focus colloquium</td>
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<tr>
<td>Master's thesis</td>
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<tr>
<td>Master's final colloquium</td>
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<tr>
<td><strong>Σ</strong></td>
<td><strong>33</strong></td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
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</table>

**Comments:**

The curriculum included here corresponds to choosing 16 CP in the field of application and 60 CP in the computer science core elective section. In case of deviating choices within the CP limits, other curricula may result due to the varying CP of the courses.

1. Students must earn at least 12 CP from each of three thematic areas, one of which must be the area of Theoretical Computer Science (modules from the area of Theoretical Computer Science are shown individually in the curriculum).

2. Depending on the module from the field of application, the CP of the individual courses vary, so that an even distribution of the CP as specified here over the semesters is not possible in all cases.
Appendix 2: Equivalence List

<table>
<thead>
<tr>
<th>Examination Regulations – 2009 Version</th>
<th>CP</th>
<th>Examination Regulations – 2023 Version</th>
<th>CP</th>
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<tbody>
<tr>
<td>Logic Programming (de)</td>
<td>6</td>
<td>Foundations of Logic Programming</td>
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<tr>
<td>Functional Programming (de)</td>
<td>6</td>
<td>Foundations of Functional Programming</td>
<td>6</td>
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<td>High Frequency Technology 1 (de)</td>
<td>5</td>
<td>High Frequency Technology - Passive RF Components</td>
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<td>High Frequency Technology 2 (de)</td>
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<td>High Frequency Technology - Antennas and Wave Propagation</td>
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<td>Systems Theory (System Theory 1 Written Exam) (de)</td>
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<td>Systems Theory 1 (de)</td>
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<tr>
<td>Systems Theory (System Theory 2 Written Exam) (de)</td>
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<td>Systems Theory 2 (de)</td>
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<td>Electodynamics – Electromagnetic Waves (de)</td>
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<td>Designing Machines and Devices I (de)</td>
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<td>Applied Design and Product Development I (de)</td>
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<td>Fundamentals of Product Development (de)</td>
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<td>Fundamentals of Internal Combustion Engines (de)</td>
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<td>Fundamentals of Mobile Propulsion (de)</td>
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<td>Kinetics of Mass Transfer (de)</td>
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<td>Plastics Processing I (de)</td>
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<td>Plastics Processing I (de)</td>
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<td>Data-Driven Methods for 3D Shape Analysis</td>
<td>6</td>
<td>Shape Analysis and 3D Deep Learning</td>
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