



**Examination Regulations for the
Software Systems Engineering
Master's Degree Course
at
RWTH Aachen University**

2011-10-01

On the basis of § 2 Sect. 4 of the Law Concerning the Colleges and Universities of the State of North Rhine-Westphalia (Higher Education Act/"Hochschulgesetz") of 31 October 2006 (GV. Law and Ordinance Gazette of NRW, p.474), last amended by Article 2 of the Act Concerning the Expansion of the Universities of Applied Sciences in North Rhine-Westphalia of 8 October 2009 (GV. NRW 2009, p. 516), RWTH Aachen University has enacted the following examination regulations:

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I. General Information

§ 1

Scope and Academic Degree

- (1) These examination regulations apply to the Master's degree course Software Systems Engineering.
- (2) In case of a successful completion of the Master's programme, the Faculty of Mathematics, Computer Science and Natural Sciences awards the academic degree of "Master of Science RWTH Aachen University (M.Sc. RWTH)".

§ 2

Objectives of the Degree Course and Language Provisions

- (1) In the Master's degree course Software Systems Engineering, the knowledge obtained in the Bachelor's degree course will be expanded and deepened in such a way that the graduate is capable of dealing with complex problems and independently undertaking scientific and research work.
- (2) The Master's degree course is a consecutive Master's degree course.
- (3) The course is mainly taught in english.
- (4) The Master's thesis may be written in either German or English.

§ 3

Admission Requirements

- (1) The admission requirement is a recognised first university degree in Computer Science or a closely related field which gives evidence of the required qualification for the Master's course. Recognised are university degrees that have been approved or officially accredited by a responsible public authority of the country in which the university is located.
- (2) In order to be sufficiently qualified for the Master's course the student applicant must have acquired the required knowledge in the following areas:

1. **Practical Computer Science:**
 - i. Programming
 - ii. Data Structures and Algorithms
 - iii. Database and Information Systems
 - iv. Software Engineering
2. **Technical Computer Science:**
 - i. Computer Engineering
 - ii. Operating Systems and Systems Software
 - iii. Data Communication and Security
3. **Theoretical Computer Science:**
 - i. Formal Systems, Automata and Processes
 - ii. Computability and Complexity
 - iii. Mathematical Logic
4. **Mathematics:**
 - i. Discrete Mathematics

- ii. Analysis
- iii. Linear Algebra
- iv. Numerical Mathematics
- v. Applied Stochastics

5. Ability to work on a bigger project comparable to a Bachelor's thesis.

- (3) The Board of Examiners may admit a student to the programme on the condition that he or she obtains additional qualifications before registering for the Master's thesis. The type and extent of such additional requirements are determined individually by the Board of Examiners on the basis of the student's qualifications and expertise gained through the prior degree course. This assessment will be done in consultation with the course coordinator or subject area advisor.
- (4) For the degree course that is mainly in English, student applicants who have not obtained their academic qualification at an English-language institution or who are not English native speakers must prove sufficient fluency in English. The following language certificates are recognised:
- a) The Test of English as Foreign Language (TOEFL) "Internet-based" test (iBT) with a result of at least 80 points
 - b) The TOEFL "paper-based" test (PBT) with a result of at least 550 points
 - c) IELTS test with a result of at least 6.0
 - d) Cambridge Test – Certificate in Advanced English (CAE)
- (6) The Board of Examiners determines, in consultation with the Registrar's Office, whether the admission requirements are fulfilled. In case of foreign applicants, the Board will consult with the International Office.
- (7) Student applicants who have already participated in a Master's course at RWTH or any other university must apply to have previous examination results – irrespective of these exams being passed or failed – credited before enrolling in or before changing to the master's course.
Upon application, the Board of Examiners can allow examination performances up to 30 credit points in individual cases for Bachelor graduates of courses of studies with a standard period of study of seven semesters.

§ 4

Standard Period of Study, Scope of the Degree Course, and Credit Points

- (1) The standard period of study, including the completion of the Master's thesis, amounts to four semesters (two years). The degree course can only be started in the winter semester.
- (2) The degree course has a modular structure. In the individual modules, the respective subject areas are being taught and the relevant competencies developed. Student performance must be assessed through an exam or any another form of assessment. The degree course, including the Master's thesis module, contains a total of 14 to 24 modules. All modules are specified in the module catalogue (see Appendix 2).
- (3) The examination performances achieved in the individual modules are evaluated according to § 9 and contribute to the overall grade (in the form of weighted credit points). CPs are not only awarded according to the scope of the module, but also reflect student effort for preparation, revision, and examinations (private study). A CP corresponds to an estimated workload of about 30 hours. A semester as a rule comprises 30 CPs, which means that 120 CPs are required for the award of the degree.

- (4) Required coursework amounts to 50 to 70 class hours per week (contact hours in lecture hours per week) plus the Master's thesis. One lecture hour per week corresponds to a 45-minute class every week during the semester teaching period. The specified lecture hours per week represent the duration of the classes only - in addition, students require time for preparation and revision of classes. Student learning time is accounted for through the award of credits as outlined in paragraph 3.
- (5) Through the provision of classes, RWTH ensures that students are able to complete their degree within two years (standard period of study) and that the modules required for the degree, including all examinations as well as the Master's thesis can be completed within the respective deadlines.

§ 5

Registration and Admission to Classes

- (1) The classes of the Software Systems Engineering Master's course are open to students enrolled for the course, cross-registered students, and, as a rule, also to students of other degree courses as well as auditing students at RWTH. Students must register for each course via a modular registration procedure. The registration deadline and procedure will be announced in the CAMPUS Information System in a timely manner. A so-called "orientation cancellation" of a semester class is possible until the last Friday in May or November (orientation phase). By way of derogation, for seminars and lab courses the orientation cancellation is possible until three weeks after the assignment of topics or the introductory meeting, respectively.
In case of an orientation cancellation for a mandatory fixed-semester class (with the exception of seminars and lab courses), a repeat registration for the next scheduled class (i.e. the next time that the class is offered) will be made automatically; this class may then not be cancelled again. Please note however that a cancellation of block courses (with the exception of seminars and lab courses) is possible up until a day prior to the first day of the course.
- (2) If it becomes necessary to limit the number of participants in a class, e.g. due to the type of instruction, research concerns, or the number of available instructors and advisors, this limitation must be in accordance with the provisions of § 59 Section 2 HG (German Higher Education Act). Students who must take part in a class as part of their degree course must be given preferential consideration. Preference is given to students for whom the class is a fixed-semester mandatory course or a required elective. Then, preference is given in the following order: variable-semester mandatory courses or required electives, free electives (§ 6 Para. 1), voluntary additional classes (according to § 8 Para. 1), and free admission (Paragraph 1).

§ 6

Examinations and Examination Deadlines

- (1) The Master's examination consists of the examinations for the individual modules as well as the Master's thesis. The examinations and final thesis should be completed within the standard period of study. Only registered students may take examinations. The modules within the curriculum can be divided into compulsory and core elective modules and, if applicable, optional modules. Compulsory modules are modules which a student is required to study. A certain number of core elective modules can be chosen by a student from a list of modules. In addition, there is a range of free electives from which the students can choose. Free electives must be differentiated from additional modules as listed in § 8. Additional modules are modules that are not included in the curriculum, but may be taken by the students voluntarily, i.e. in addition to the curriculum.

- (2) Class attendance requires modular registration. When registering for classes in compulsory modules, an automatic registration for the class examination is performed. This registration takes place automatically on 1 December for the winter semester and on 1 June for the summer semester. This does not affect § 5 Section 1, however. For required elective modules, optional modules and additional modules no such automatic registration is performed. For seminars and lab courses the exam registration is done automatically after the three weeks period for orientation cancellation has run out.
- (3) The students should take classes at the time defined by the curriculum. The precise registration and cancellation procedures will be announced through the CAMPUS Information System. The registration for an examination is also a conditional registration for the resit examination. This does not affect § 5 Sect. 1.
- (4) The Board of Examiners makes sure that during the examination period, students may take examinations for those classes which are part of the Master's examination, which are offered in that semester. Repeat examinations are offered in the following semester the latest.
- (5) The legal maternity and parental leave periods as well as times of absence due to the responsibilities for care of children as defined in § 25 Sect. 5 of the German Federal Education and Training Assistance Act (*Bundesausbildungsförderungsgesetz*) and for care of spouses, registered partners, direct relatives or in-laws must be taken into consideration.
- (6) If a candidate is not able to take an examination, partially or in its entirety, due to longer-lasting or permanent physical disability or chronic illness, and provides a medical certificate as evidence for his or her condition, the Chair of the Board of Examiners must permit the candidate to take an equivalent examination in another form. When determining mandatory industrial placements or study abroad periods as part of a course, equivalent qualifications are to be defined for those students who due to their medical condition are not capable of completing them, despite the support provided by the University.
- (7) Students on leave are not authorised to obtain credits or take examinations. This does not apply to the re-sit of a failed examination and for assessments (experience reports) for the study abroad or practical training period for which the leave was granted. It also does not apply if the leave is due to responsibilities for the care of children according to § 25 Sect. 5 *Bundesausbildungsförderungsgesetz* or due to the care of spouses, registered partners, or direct relatives or in-laws.

§ 7

Types of Examination

- (1) As a rule, the assessment of student achievement takes the form of written or oral examinations. An examination may also take the form of an oral presentation, a term paper, a research paper, a project paper, or a colloquium. As part of the completion of a module, proofs of participation ("Teilnahmenachweis", ungraded) as well as assessments ("Leistungsnachweis", graded) may be required. Certain assessments and proofs of participation may be defined as admission requirements for further assessments to be completed as part of a module. Assessments can take the same form as examinations. A proof of participation certifies that the student has regularly attended a class and participated in class discussion.
- (2) The form and materials/aids allowed in the examination are typically announced at the beginning of a class. At the latest, they must be announced four weeks prior to the examination. This does not affect the validity of § 13 Sect. 5. In the case of several

examinations, information must be provided on how the individual grades achieved contribute to the overall grade for the class.

The date of the examination as well as the name of the examiner must be announced in the CAMPUS system by mid-May (summer term) or 15 December (winter term) at the latest. In case of oral examinations, an individual date may be arranged, the name of the examiner, however, must be specified by the above dates.

- (3) In **oral examinations**, candidates are expected to prove their understanding and breadth of awareness of the subject area and that they are able to classify specific problems within the field. The oral examination is also to assess whether the candidate has acquired a wide basic knowledge. Oral examinations are held either by several examiners (oral examination by panel) or by one examiner in the presence of a co-competent assessor. In case of group examinations, the maximum number of candidates is four.
In the oral exam, each candidate is interviewed by only one examiner in the subject area under examination. Before deciding on a grade according to § 9 Sect. 1, the examiner must consult with the assessor. Written notes of the contents of the exam and the candidate's performance must be taken. The candidate is to be informed of his or her grade right after the oral examination. For each candidate, The duration of an oral examination is at least 15 minutes and 30 minutes at most. In the case of a supplementary oral examination according to § 13 Sect. 2, the assessment by one examiner is sufficient. In case of a group examination, care must be taken that the above named examination duration is observed for each candidate.
- (4) Students who want to take the examination in a later examination period can be allowed to be present at the examination, provided that sufficient space is available space and that the candidate agrees to auditors being present. These auditing students are not allowed to be present during the examiners' consultation and the announcement of the examination results.
- (5) In **written examinations**, candidates are to prove that they are able to identify and find ways to solve a discipline-specific problem in a limited period of time and with limited resources, using established methods and approaches. The duration of a written examination is at least 60 but no more than 120 minutes.
A preparation time that does not infringe on the test-taking time is also possible. The precise examination duration is specified in the module catalogue.
- (6) Multiple choice tests may also be used as part of written examinations. Details concerning the assessment of tests can be found in § 9 Para. 2 and 3.
- (7) Every written examination is to be graded by the examiner. If a written examination is graded by two examiners according to § 13 Para. 4, the grade of the written examination is calculated from the arithmetic mean of the individual assessments. The examiners can assign suitable research assistants who are knowledgeable in the subject matter and have a relevant Master's degree (or equivalent or a higher degree) to perform the preliminary assessment of the written examination. In case of a supplementary oral examination according to § 13 Para. 2, the assessment by one examiner is sufficient.
- (8) An **oral presentation** is a talk with a minimum duration of 30 and a maximum duration of 60 minutes, based on a written paper. The presentation is to prove that the candidate is able to provide a scientific/scholarly analysis of a specific topic, taking into account the relevant contexts of the subject area, and present the results orally.
- (9) In a **written term paper**, a problem from the subject area of the class is thoroughly addressed and possible solutions are presented, drawing on the relevant literature and, if applicable, to suitable aids and materials. Suitable aids and materials are announced as part of the term paper assignment. § 7 Para.7 Sentence 2 applies accordingly.

- (10) **Written homework** assigned and evaluated during the semester are to gradually prepare students for subsequent examinations. Homework assignments may contribute up to 10 percent to the final grade for the class. The instructor is to provide precise criteria for obtaining bonus points at the beginning of the semester or by the first day of the course; this information is to be announced in the CAMPUS System.
- (11) Within the scope of a **project paper**, a minor, well-defined scientific problem is to be independently addressed in writing. The project is undertaken under supervision.
- (12) Within the scope of a **research paper**, students address a topic from the subject area of the Master's degree course based on literature research. The paper amounts to, depending on the topic, between 10 and 20 pages. The research paper is usually to be addressed within the period of one semester and ends with an oral presentation.
- (13) In the **colloquium**, students are to prove in a discussion with the examiner and other participants that they are familiar with the subject matter of the course and are able to classify questions and problems in the contexts of the discipline. The colloquium can begin with an oral presentation as outlined in section 8.
- (14) In the **practical training / lab course**, students learn to perform independent experimental work, when they design, implement and test software and hardware systems, and evaluate and present results in a scientific manner. Usually, the practical training is performed in small groups to train the ability to work in teams.
- (15) Examinations as outlined in paragraphs 8 through 14 can also be approved as group work as long as the assessment of each group member's individual contribution is possible.

§ 8

Additional Modules

- (1) The candidate can take examinations in further modules of his or her choice (additional modules).
- (2) The results of examinations taken in these modules may, upon request by the candidate to the Board of Examiners, be listed in the final academic transcript. These results however do not contribute to the overall grade of the degree.

Assessment and Grades

- (1) The grades for the individual examinations are determined by the respective examiners. For the evaluation, the following grades are to be used:

1 = Very good	An excellent performance
2 = Good	A performance which is clearly above the average requirements
3 = Satisfactory	A performance that meets the requirements
4 = Sufficient	A performance that still meets the requirements, despite being flawed
5 = Unsatisfactory	A performance that does not meet requirements due to substantial flaws

By raising or lowering the individual marks by 0.3, intermediate values can be formed for a differentiated evaluation. The grades 0.7, 4.3, 4.7, and 5.3 are excluded. Performances that are not graded obtain an evaluation of "Pass" or "Fail."

- (2) Multiple choice is a format used in examinations which provides a number of pre-given answers to a question for selection. The evaluation criteria must be announced on the test sheet as well as on a bulletin board or in the CAMPUS Information System (14 days prior to the examination). A test which consists solely of multiple choice questions is considered to be passed if
- a) 60% of the questions asked are answered correctly or
 - b) the number of correctly answered questions does not fall short of 22 percent below the average performance of candidates who have participated in the test for the first time.
- (3) If the candidate has answered the minimum number of questions correctly according to Paragraph 2 and thus passed the test, the mark is as follows:
- Very good if he or she has answered 75%
 - Good if he or she has answered at least 50%, but less than 75%
 - Satisfactory if he or she has answered at least 25%, but less than 50%
 - Sufficient if he or she has answered 0% or less than 25%
- of questions in excess of the minimum number correctly.
- (4) If a written examination consists of both multiple choice and other types of questions, the multiple choice questions are evaluated according to paragraphs 2 and 3. The other questions are evaluated according to the method usually used for the respective type of question. The grade is determined taking into account the weighted results of both parts of the examination. The weighting is to be performed according to the percentage of both types of questions (multiple choice and other) in the written examination.
- (5) An evaluation of the examination takes place only when the candidate is enrolled in the degree course at the time of the examination or submission of the assignment to be evaluated. The grade awarded for the examinations must be announced after six weeks at the latest, and it must be ensured that the assessment takes place at least ten days prior to a possible resit examination. The students are automatically informed via email (to their RWTH email address) of their achieved grades through the CAMPUS Information System; also, the examination results are posted on a bulletin board. Students can also obtain their current transcript through CAMPUS.
- (6) An examination is considered to be passed when the mark is at least "Sufficient" (4.0).

If an examination consists of several partial performances, the mark takes all partial performances into consideration. In the process, every partial performance must be evaluated with a minimum mark of "Sufficient" (4.0) or have been passed. For the marks, Paragraph 8 applies accordingly.

- (7) A module is considered passed if all examinations which are part of the module have been passed with a minimum mark of "Sufficient" (4.0) and all CPs that belong to it (e.g. proofs of participation and assessments) have been earned. For each module, the CPs are credited according to the appendix (see module catalogue).
- (8) The overall grade is formed from the marks of the modules and the grade of the Master's thesis. In this case, the individual marks of the modules are weighted with the respective credit points, with the exception of the depth oral colloquium ("Schwerpunktkolloquium") (§ 15 Para. 5) which is weighted with four times the value of its credit points. The overall grade of a passed Master's examination may be as follows:

Average grade to 1.5	= Very good
Average grade between 1.6 and 2.5	= Good
Average grade between 2.6 and 3.5	= Satisfactory
Average grade between 3.6 and 4.0	= Sufficient

Upon request by the candidate to the Board of Examiners, the least favourable of the weighted module grades (with the exception of the Schwerpunktkolloquium) from the five module areas (§ 15 Para. 4) is not taken into consideration for the final grade. As a prerequisite, all module examinations must have been completed in the standard period of study.

- (9) For the calculation of the grades and the overall grade, individual grades are rounded down to one decimal place. All other decimal places are not taken into account.
- (10) The overall grade of "Passed with Honours" ("Mit Auszeichnung") is awarded if for the Master's Thesis, a grade of "1.0" is awarded and the weighted average of all other grades attained in the Master's examination is 1.3 or better. This grade is awarded instead of the grade "Very Good" as outlined in paragraph 7.

§ 10 Board of Examiners

- (1) For the organisation of the examinations and the tasks and responsibilities resulting from the present examination regulations, the Faculty of Mathematics, Computer Science and Natural Sciences will form a Board of Examiners. The Board of Examiners consists of the Chair, the deputy chair, and five other members with voting rights. The Chair, Deputy Chair, and two other members will be selected from among the group of professors, one member from among the research assistants, and two members from among the group of students. For the each member of the Board of Examiners, a deputy will be nominated. The term of office of the professorial and research staff members will amount to two years, whilst the term of office for student members will amount to one year. Re-election into the Board is possible.
- (2) The Board of Examiners is a public authority according to the Administrative Procedure Law and the Law of administrative court procedure.
- (3) The Board of Examiners makes sure that the provisions of the examination regulations are observed and that the examinations are properly conducted. In particular, the Board decides on objections to decisions made in the examination procedure. In addition, on a regular basis and at least once a year, the Board of Examiners must

present a report to the Faculty containing statistics and general data on examinations and periods of study. It provides suggestions on how the examination regulations and curricula can be further improved and publishes the distribution of grades and overall grades. The Board of Examiners can transfer the execution of its everyday tasks to the Chair of the Board. This does not apply to decisions regarding objections and the report to the Faculty.

- (4) The Board of Examiners is quorate if, in addition to the Chair and the Deputy Chair, two additional professors with voting rights (or their deputies) and at least two additional voting members (or their deputies) are present. Board decisions shall be made by simple majority. In the event of a tie, the Chair has the casting vote. The student members of the Board of Examiners do not take part in decisions on the crediting of study and examination performances.
- (5) The members of the Board of Examiners have the right to be present during examinations.
- (6) The sessions of the Board of Examiners are not public. The members of the Board of Examiners and their representatives are subject to professional discretion. Insofar as they are not members of the public service, the Chair of the Board of Examiners must see to it that they commit themselves to confidentiality.
- (7) The Board of Examiners obtains administrative aid from the Central Examinations Office (ZPA) in the performance of its duties.

§ 11 Examiners and Co-Assessors

- (1) The Chair of the Board of Examiners appoints the examiners. The examiners appoint co-assessors, if applicable. The appointments must be put on record. Appointed as examiners may be academic staff who have at completed the corresponding or comparable final examination and who have independently taught the section of studies preceding the examination in the respective module. Only if there is good reason, a deviation from this policy is possible. Only people with a corresponding academic degree (or equivalent) may be appointed as co-assessors.
- (2) Examiners are independent in their activities as examiners. § 10 Sect. 6 Sentence 2 applies accordingly. This also applies to the co-assessor.
- (3) The candidate may suggest an examiner for the Master's thesis and the written and/or oral examinations. If possible, the suggestions of the candidate should be taken into consideration. The suggestions, however, do not constitute a legal claim.
- (4) The Chair of the Board of Examiners has to ensure that the candidate is informed of the name of their examiner at least until mid-May (summer term) or mid-November (winter term). A bulletin board notice or announcement in the CAMPUS Information System suffices.

§ 12

Credit for Period of Study, Academic Performance, Examination Performance, and Admission to a Higher Semester of the Degree Course

- (1) Passed and failed performances at another university within the scope of the German Constitution in an equivalent degree courses will be credited ex officio. Passed and failed performances in other degree courses or at other universities and at state and officially recognised universities of cooperative education within the scope of the German Constitution are to be credited in case of equivalence; this also applies, upon application, for performances at universities outside of the scope of the German Constitution. Upon application, the university can credit other qualifications on the basis of submitted certificates and documents.
- (2) The equivalence of performances is to be determined when periods of study, academic performances, and examination performances essentially correspond to those of the Software Systems Engineering master's degree course in content, scope, and requirements. The assessment process should not involve a merely schematic comparison, but rather a consideration and evaluation of the entire situation. For the equivalence of periods of study, academic performances, and examination performances made outside of the scope of the German Constitution, the equivalency agreements and agreements made within the scope of university partnerships made by the Standing Conference of the Federal Ministers of Education and Cultural Affairs must be taken into consideration. Otherwise, in case of doubt of equivalency, the Central Office for Foreign Educational Systems ("Zentralstelle für ausländisches Bildungswesen") can be consulted.
- (3) The Board of Examiners is responsible for crediting according to Paragraphs 1 and 2. An expert in the respective discipline should generally be consulted to determine equivalency.
- (4) If academic and examination performances are to be credited, the grades - insofar as the grading systems are comparable - should be included in the calculation of the overall grade. In case of incomparable grading systems, the note "Credited" will be recorded. Credited qualifications are marked as such in the final academic transcript.
- (5) In case the prerequisites of Paragraphs 1 and 2 are met, periods of study, academic performances, and examination performances made within the scope of the German Constitution will be credited ex officio. The student must provide the necessary documents for crediting.

§ 13

Resit Examinations, Master's Thesis, and Expiry of the Right to Take an Examination

- (1) In case of "unsatisfactory" (i.e. failed) performances, the examinations can be repeated twice; the Master's thesis may be repeated once. The candidate may reject the topic of the Master's thesis, but only if he or she has not already taken advantage of this possibility whilst writing his or her first Master's thesis.
It is possible to exchange the examinations of the compulsory core elective and free elective areas. Details are regulated by the Board of Examiners.
- (2) If a candidate receives a mark of "Unsatisfactory" (5.0/failure) when re-sitting a written examination for the second time and if this mark was not given due to an attempt at cheating, default, or withdrawal without good reason according to § 14 Para. 2, the candidate has the chance to take a supplementary oral examination before the examination is considered a "fail" (5.0). The date for the supplementary oral examination is specified with the exam review and is set at most four weeks after the

exam review. For this supplementary oral examination, § 7 Para. 3 applies. Based on the candidate's performance in the supplementary oral examination, the grade will be either "Sufficient" (4.0) or "Unsatisfactory" (5.0).

- (3) The candidate must register for the repeated Master's thesis within three semesters after the failed first attempt. For the deadline, § 8 Para. 3 of the German Tuition Fees and University Dues Act ("Studienbeitrags- und Hochschulabgabengesetz") applies. The use of safeguard provisions according to §§ 3, 4, 6 and 8 for maternity leave and for care of spouses, registered partners, direct relatives or in-laws will not be counted for this deadline. If this deadline is exceeded, the right to take an examination expires unless the candidate was not responsible for the default.
- (4) Written and oral examinations that conclude a degree course according to the curriculum as well as resit examinations for which no compensation possibility is provided in the case of failure must be assessed by at least two examiners. This does not affect § 7 Para. 7.
- (5) Resit examinations may take the form of written and oral examinations, according to the decision of the examiner. Candidates are to be informed on the bulletin board about whether the repeat examination is in written or oral form at least two weeks prior to the examination.
- (6) If an examination consists of several parts, only the part of the examination that was not passed must be repeated.
- (6) A module is considered to be ultimately failed if the examinations required for passing can no longer be repeated.
- (7) The Master's examination is ultimately failed if the performances to pass a module can no longer be repeated or if the second Master's thesis was evaluated as or considered to be "Unsatisfactory."

§ 14

Cancellation of Registration, Default, Withdrawal, Cheating, and Violation of the Regulations

- (1) Up until a week before the respective examination date, the candidate may cancel an examination once without giving a reason. The cancellation of an examination is at the same time a registration for the examination at the next scheduled examination date.
- (2) An examination performance is considered to be "Unsatisfactory" (5.0) if the candidate does not appear at an examination without good reason or if he or she withdraws from the examination after the start of the exam without good reason. The same applies if a written examination is not completed within the duration of the exam. In this case, the student has no right to a supplementary oral examination. The last sentence in Paragraph 1 applies.
- (3) The reasons for the withdrawal or default must be submitted and proven in writing to the Board of Examiners immediately. In case of illness, the candidate must present a medical certificate. In individual cases, the Chair of the Board of Examiners may demand a certificate by an independent medical examiner, to be appointed by the Board of Examiners. If the Board of Examiners does not accept the reasons, the candidate will be informed in writing. The previous examination results are to be credited. The last sentence in Paragraph 1 applies.

- (4) In the case of written examinations - with the exception of those held under supervision - the candidate must affirm in lieu of an oath that the examination was performed by the candidate him- or herself without impermissible aids or external help.
- (5) If the candidate tries to influence the result of an examination through cheating, for example, the use of impermissible aids, the respective examination is evaluated as "Unsatisfactory" (5.0). The determination is made by the respective examiner or the person responsible for supervision and put on record. A candidate who disturbs the proper course of the examination may generally be excluded from continuing the examination by the respective examiner or the examination supervisor. In this case, the respective examination is evaluated as "Unsatisfactory" (5.0). The reasons for the exclusion must be put on record. In case of multiple or otherwise severe cheating attempts, the candidate may also be exmatriculated.
- (6) The candidate must be informed of incriminating decisions immediately in writing; the basis for these decisions must be thoroughly explained and information on applicable legal remedies must be provided.

II. Master's Examination and Master's Thesis

§ 15

Type and Scope of the Master's Examination

- (1) The Master's examination consists of:
 1. The examinations and other performances for the modules listed in Paragraph 3 to 6 and
 2. The Master's thesis and the Master's defence colloquium
- (2) The curriculum provides information on the ideal order of the classes, examinations and assessments. Examinations and assessments are taken during the course of studies. The topic of the Master's thesis cannot be assigned until 60 CPs have been achieved.
- (3) In total, examinations in mandatory modules and required electives in the amount of 90 CP have to be taken. Those are to be structured as follows:
 1. Lectures in Computer Science in the amount of 68 CP
 2. Two seminars in Computer Science (each 4 CP)
 3. One lab course in Computer Science (7 CP)
 4. A depth oral colloquium („Schwerpunktkolloquium“) in Computer Science (3 CP)
 5. German language course (4 CP) or substitute

At least one of the seminars has to be taken either in the area “Theoretical Foundations of Software Systems Engineering” or in the area “Software Engineering”.
- (4) The courses in Software Systems Engineering are structured in five areas:
 1. Theoretical Foundations of Software Systems Engineering
 2. Communication
 3. Data and Information Management
 4. Applied Computer Science
 5. Software Engineering

The allocation of modules to these areas is shown in the module handbook for lectures and is given with the announcement of the course for seminars and lab courses. The allocation of the depth oral colloquium („Schwerpunktkolloquiums“) is being made by the examiner upon content-related criteria. The total amount of examinations for courses, except for the depth oral colloquium, in each of the five areas must not exceed 35 CP. In the area “Theoretical Foundations of Software Systems Engineering“ examinations for at least 12 CP have to be taken and passed, where at least two lectures have to be chosen from "Model Checking", "Theoretical Foundations of UML", "Functional Programming", "Logic Programming" or "Theoretical Foundations of Distributed Systems". In the area “Software Engineering“ students need to take and pass exams for at least 16 CP, where 4 CP are from the mandatory lecture “Software-Project Management” and further 12 CP have to be chosen from "Model-based Software Engineering", "Generative Software Engineering", "Object Oriented Software Construction", "Software Architectures", "Safety and Reliability of Software-controlled Systems", "Designing Interactive Systems" or "Information Management". The two seminars and the lab course must not be all taken from the same area.

- (5) In the depth oral colloquium contents from at least three modules in the total amount of 12 to 18 credits are being examined orally in connection. Regarding the implementation the regulations for oral exams apply as given in § 7 Para. 3. By way of derogation the length of the colloquium is determined to be at least 20 and at most 45 minutes. The courses should have a close relationship regarding their content. In the depth oral colloquium students need to prove that they are able to capture a broader subject matter, that they recognise content-related references, and that they are able to

connect results from different areas. Independent from the depth oral colloquium the single classes can be examined individually and the grades can be counted towards the Master's examination.

- (6) Students must take either a German language course or an examination in a non-technical area of their choice. That is, students whose native language is not German need to take the German language course for English-taught master programmes offered by the language center („Sprachenzentrum“) of RWTH Aachen. Students who have already proven sufficient knowledge in German by either the „Zertifikat Deutsch (ZD)“ with a grade of at least „gut“ or the „Test Deutsch als Fremdsprache (TestDaF)“ level 3 in all examination areas are being exempted from taking the German language course and the associated examination. Instead, they can choose another examination from any non-technical area with a minimum amount of 4 CP. The same holds for students whose native language is German.
- (7) The modules that can be chosen for the Master's examination can be looked up in the currently valid version of the module manual. The Board of Examiners can update the catalog of available required electives to reflect changes in the course offering. Modules that are largely identical to courses already completed in a Bachelor's programme cannot be chosen for the Master's programme.
- (3) The contents of the examinations and assessments are determined by the content of the respective classes as outlined in the module manual.

§ 16 Master's Thesis

- (1) The Master's thesis consists of a written paper submitted by the candidate. The thesis is to prove that the candidate is capable of independently addressing a problem using scientific/scholarly methods within a limited period of time. The thesis is written under supervision.
- (2) The Master's thesis can be assigned and supervised by any professor, habilitated or post-doctoral staff, adjunct professors, assistant professor, honorary professors, and guest professors in the department of Computer Science who is involved in research and teaching activities at RWTH. Assistant lecturers and research assistants may act as assistant supervisors. In exceptional cases and with permission of the Board of Examiners, the Master's thesis can be conducted outside of the Faculty or RWTH, as long as it is supervised by one of the persons named in Sentence 1.
- (3) Upon special application of the candidate, the chair of the Board of Examiners makes sure that the candidate receives the topic for the Master's thesis at the planned time. The candidate must be given the opportunity to make suggestions for the topic.
- (4) The Master's thesis can be written in either German or English as agreed upon with the examiner.
- (5) The Chair of the Board of Examiners informs the candidate of the final deadline for the submission of the thesis. The date on which the candidate receives the thesis topic as well as the title of the topic must be put on record.
- (6) As a rule, the candidate must complete the Master's Thesis within six months. The written paper should not exceed 80 pages without the appendix. The topic and task must be designed in such a way that a completion is possible within six months of full-time work. In coordination with the supervisor and the course convenor („Fachstudienberater/in“), a period of part-time work on the thesis of up to 12 months may be granted. In this case, a written application must be submitted to and approved

by the Board of Examiners. The topic can be rejected only once and only within the first month of the writing period. In individual cases, for good reason, the Board of Examiners can extend the writing period by up to six weeks. This decision is to be based on an application by the candidate and made in agreement with the thesis supervisor.

- (7) The candidate will present the results of the Master's thesis in a Master's colloquium. In this context, § 7 Para. 13 applies.

§ 17

Acceptance and Assessment of the Master's Thesis

- (1) The Master's thesis is to be submitted on time to the Central Examination Office (ZPA). Three copies of the thesis are to be submitted. The date of submission must be put on record. If the Master's thesis is not handed in on time, it will be considered "Unsatisfactory" (5.0/fail). The thesis is assessed only if the candidate is enrolled in the degree course at the time of submission.
- (2) As a rule, the examiner of the thesis is also person who has assigned the topic. The thesis is generally the last part of the Master's examination. In accordance with § 9 Para.1, the thesis should be assessed by two examiners, who provide a written statement on their assessment. The grade for the thesis is calculated from the arithmetic mean of the individual assessments according to § 9 Para. 1 as long as the difference between the assessments is not higher than two grades. If the difference between the grades more than 2.0 or if one evaluation is "Unsatisfactory," but the other "Satisfactory" or better, a third examiner will be appointed by the chair of the Board of Examiners in order to evaluate the Master's thesis. The third examiner will determine the final grade of the Master's thesis, which is to be between the two grades provided by the other examiners, within four weeks.
- (3) The announcement of the grade – with the exception of Paragraph 2 Sentence 4 - will be made within eight weeks after submission. If this announcement is not made on time, the Board of Examiners is authorised to appoint other examiners for the thesis.
- (4) For the writing of the Master's thesis, 27 CPs are awarded. The colloquium is graded and included in the overall grade with a weighting of 3 CPs.

§ 18

Passing of the Master's Examination

The Master's examination is considered to be passed when all necessary modules are passed and the grade of the Master's thesis is at least "Sufficient" (4.0). The Master's degree course is concluded with the passing of the Master's examination.

III. FINAL PROVISIONS

§ 19

Final Academic Transcript, Degree Certificates, and Certifications

- (1) If the candidate has passed the Master's examination, he or she will receive the final academic transcript within three months after the final examination. The academic transcript lists all modules taken, names the topic of the Master's thesis, and provides all achieved grades and credit points (CP). Also, it includes the overall grade and lists the additional modules completed by the candidate. The overall grade is specified in writing, and is also represented as a number with one decimal place. The final transcript is signed by the Chair of the Board of Examiners.
- (2) The transcript bears the date on which the final examination was passed or the final assessment provided.
- (3) The transcript contains information in both German and English.
- (4) At the same time as the final academic transcript, the candidate will obtain a degree certificate in German and English which bears the date of the transcript. The degree certificate confirms the award of the Master's degree. The degree certificate is signed by the Dean of the Faculty and the Chair of the Board of Examiners.
- (5) Together with the report, the graduate receives a "diploma supplement" written in German and English. The diploma supplement provides information on the individual subject profile of the completed degree course. The diploma supplement also provides an overview of achieved ECTS points.
- (6) If the Master's examination is finally not passed, the chair of the Board of Examiners will inform the candidate in writing; this letter will also contain information on applicable legal remedies.
- (7) Students that leave the university without a degree will obtain a report of all study and examination performances upon request.

§ 20

Invalidity of the Master's Examination, Deprivation of the Academic Degree

- (1) If the candidate has cheated in an examination and this fact is not discovered until after the final academic transcript has been handed out, the Board of Examiners may subsequently correct the grades of the examinations in which the candidate cheated and declare the examination to be entirely or partially failed.
- (2) If the prerequisites for the admission to an examination were not fulfilled without the candidate intending to cheat and this fact does not become known until after the final transcript has been handed out, this problem can be remedied by the candidate's passing the test. If the candidate wrongly and premeditatedly obtained admission, the Board of Examiners will decide on the legal consequences under observance of the Administrative Procedure Law ("Verwaltungsverfahrensgesetz") of the Federal State of North Rhine-Westphalia.
- (3) Before a decision is arrived at, the candidate in question has the opportunity to make a statement.
- (4) The incorrect final academic transcript must be returned and, if applicable, a new one will be issued. A decision according to Paragraph 1 and Paragraph 2 Sentence 2 is excluded after a period of five years after the final academic transcript is issued.

- (5) If the examination is declared to be failed as a whole, the academic degree will be withdrawn by the Faculty. Also, the degree certificate will be withdrawn.

§ 21

Viewing of Examination Scripts

- (1) The candidate must be able to view the corrected written examination or paper after the grades have been finalised. The candidate will be informed of the time and place of the viewing of scripts session during the examination or when receiving the grade at the latest. The student must be given sufficient time for viewing, at least 20 minutes.
- (2) Insofar as Paragraph 1 does not apply, the candidate will be permitted to view the written examination, the related comments by the examiners, and the examination reports upon application at the end of the examination procedure.
- (3) The application must be submitted to the Chair of the Board of Examiners within a month of the receipt of the final academic record. The Chair of the Board of Examiners sets the time and location of the viewing session.

§ 22

Coming into Effect, Publication, and Transitional Regulations

- (1) These examination regulations enter into effect on the day of publication and are published in the Official Announcements of RWTH Aachen University (“Amtliche Bekanntmachungen”)
- (2) These examination regulations apply to all students whose date of enrolment in the Software Systems Engineering Master’s degree course at RWTH Aachen University was in the winter semester of 2011 or later.
- (3) Students who have enrolled in the degree course before WS 2011 may switch to these examination regulations upon request. They may study according to the previous regulations of 01.03.2011 for a maximum period of two years after the present regulations have entered into force. After the two-year period, a switch to these regulations is mandatory.

Created on the basis of the decision of the Faculty Council of the Faculty of Mathematics, Computer Science and Natural Sciences.

The Rector
of
RWTH Aachen University

Aachen, _____
Date

signed Schmachtenberg
Univ.-Prof. Dr.-Ing. E. Schmachtenberg

Appendix 1

Module Catalogue

This module catalogue provides the current status on the day the decision on the examination regulations was made; any changes that do not concern the examination forms will be announced online under: ...

Module A: Add title (add number of CPs)

MODULE TITLE (CP)					
GENERAL INFORMATION					
Semester	Duration	Lecture hours per week	Frequency	Cycle	Language
1	2	8	Annual	WS	English
INFORMATION ON CONTENT					
Content			Learning targets		
...			...		
Prerequisites			Marking		
...			...		
INSTRUCTION FORMS/COURSES AND RESPECTIVE EXAMINATIONS					
Course	CP	Lecture hours per week	Examination	CP	Lecture hours per week
Lecture I			Written examination (60 min.)		
Exercise I			Homework (weekly)		
Seminar I			Oral presentation (20 min.)		
			Term paper (15 pages)		
Lecture II			Written examination (60 min.)		
Exercise II			Homework (weekly)		
Seminar II			Oral presentation (20 min.)		
			Term paper (15 pages)		

Appendix for the General Requirements for a Master's Course of Study**Glossary****Cancellation**

It is possible to cancel examinations. The individual possibilities are listed in the respective examination regulations.

Academic degree

After successful studies, an academic degree is awarded.

In the case of a Master's course of study, the academic degree of "Master of Science RWTH Aachen (M.Sc. RWTH)" is awarded. For the liberal arts, the academic degree of "Master of Arts RWTH Aachen University (M.A. RWTH)" is awarded.

Accreditation

Accreditation is a special tool for quality assurance or control. Its objective is to guarantee quality in instruction and studies by determining minimum standards. Accreditation is performed by an external instance (council, agency, commission) that checks according to a given standard and decides whether the course of studies fulfils the respective requirements.

Registration for examinations

The current methods on the websites of the Central Examination Office (ZPA) apply here.

Practical work experience

Some courses of study require that the students prove practical work experience (practical training). The details can be found in the corresponding examination regulations. It is recommended that information be obtained in a timely manner since practical training must sometimes be proven before the start of studies.

Leave of absence

In case of an important reason, a leave of absence can be granted according to the matriculation regulations. The application for the leave of absence should be made during the re-registration period. Information can be obtained from the Students Office of RWTH.

Block course

A block course is a course that does not take place over an entire semester, but rather concentrated over a few days, for example, a week.

CAMPUS Information System

The Web-based information system of RWTH. In addition to additional online services, it comprises the university calendar, the registration and cancellation of courses and examinations, the description of the examination regulations, and a personal student portal with individual schedules.

Credit points

The examinations performed in the individual modules are evaluated and included in the overall mark in a weighted manner together with the credit points (CP). CPs are not only awarded according to the extent of the course, but also comprise the time and effort of the students for preparation, revision, and examinations (self-study) incurred by the module. A CP corresponds to the estimated effort of about 30 hours. A semester generally comprises 30 CPs. The Master's course of studies thus comprises a total of 120 CPs.

Curriculum

The word "curriculum" is occasionally equated with "syllabus" or "instruction time requirement." A syllabus is generally limited to a list of the instructional content. The curriculum is geared more toward instruction times and the sequence of the course of study.

Diploma supplement

The diploma supplement (DS) is a separate document that describes the university degrees obtained and the corresponding qualification. The DS explains the German university system and its degrees, as well as the awarding university, often including the concrete content of the completed course of study. The DS is issued in English and German and enclosed with the final report. The DS is also intended to provide employers with information.

Proof of performance

A proof of performance is the certification of an individual academic performance and thus a type of examination performance. A proof of performance can be defined as an admission prerequisite for additional performances to be made. Proofs of performance, for example, can be obtained in the form of written examinations, oral examinations, oral presentations, research papers, and so on.

Module

Modules are a combination of courses dedicated to a certain topic or contentual focus. A module is thus a contentually and temporally encapsulated instructional and learning unit composed of various courses.

Module manual

The individual modules are described in regard to

- Semester
- Duration
- Lecture hours per week
- Frequency
- Cycle
- Language
- Content
- Learning targets
- Prerequisites
- Marking
- Examination performance

in the module manual. The module manual is to be created especially for the students and must be published.

Modular registration

Modular registration is the registration to an academic event (course, seminar, examination, etc.) for a partial performance within an individual module. Modular registrations are performed using the modular registration procedure of the CAMPUS Information System (Module IT).

Supplementary oral examination

If the student also fails the second resit of a written examination and a mark of "Unsatisfactory" (5.0) is determined, a supplementary oral examination is possible. On the basis of this supplementary oral examination, a mark of "Sufficient" (4.0) or "Unsatisfactory" (5.0) is determined.

Multiple choice

Multiple choice is a format used in examinations in which several preformulated answers to one question are provided for selection.

Orientation phase

The orientation phase is the first five weeks after the beginning of classes.

Orientation cancellation

The cancellation of courses is possible within the first five weeks.

Board of Examiners

For the organisation of the examinations, the faculties form corresponding Boards of Examiners. The details are regulated in the examination regulations.

Examination performances

Examination performances comprise all work that must be performed within the scope of the studies. This includes visiting courses, written and oral examinations, oral presentations, term papers, research papers, colloquiums, practical training, drafts, and final theses.

Compulsory area

The compulsory area comprises courses that are mandatory and must be visited by all students.

Viewing of examination

After the marks are announced, students may view the corrected written examination or paper.

Normal period of time for the completion of studies

The normal period of time for the completion of studies is the academic period in which a qualified professional degree can be obtained. At RWTH Aachen University, the normal period of time for the completion of studies currently amounts to three or four semesters.

Lecture hour per week

A lecture hour per week corresponds to a 45-minute course every week during the entire lecture time of a semester. The lecture hours per week refer to the pure duration of the courses.

Fixed-semester/variable-semester

An examination performance is a fixed-semester performance if it is mandatory that it be made during a precisely defined semester during the studies. Otherwise an examination performance is a variable-semester performance.

Academic counselling

The Central Academic Counselling offers general information on the academic possibilities at RWTH Aachen and provides help in preparing examinations and in application procedures. The subject area counselling provides detailed information on subject-related issues.

Start of studies

The studies generally start in winter semester. They can sometimes start in summer semester.

Proof of participation

A proof of participation certifies the active participation in a course. A proof of participation can be defined as an admission prerequisite for additional performances to be made.

Transcript of records

The transcript of records (ToR) is a copy of the student data that provides a detailed overview of the passed modules, including the course, mark, and CP.

Free elective course

A free elective area from which students must select courses that can be freely selected can be provided.

Compulsory core elective

A certain number of compulsory core elective courses must be chosen from a provided list and proven.

Mandatory registration initiated by the Central Examination Office (ZPA) for repeat examinations

Mandatory registration is an automatic registration in the Central Examination Office (ZPA) for all students who have not passed an exam or who have cancelled an exam basically at the next possible examination date. Students do not have to be separately notified about this registration; the mandatory registration can be found in the virtual Central Examination Office in CAMPUS Office.

Additional module

Additional modules are modules that are not included in the curriculum, but may be taken by the students additionally and voluntarily.