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Examination regulations for the degree program “Computer Simulation in Science” with the degree of Master of Science at the University of Wuppertal

Dated 17 December 2020¹

In accordance with § 2, section 4 and § 64 section 1 of the Higher Education Act (HE Act) of the State of North Rhine-Westphalia (NRW) dated 16 September 2014 (GV. NRW. p. 547), last amended on 01 December 2020 (GV. NRW. p. 1110), the University of Wuppertal has enacted the following examination regulations.

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¹ This document refers to and is a translation of the „Prüfungsordnung für den Studiengang Computer Simulation in Science mit dem Abschluss Master of Science an der Bergischen Universität Wuppertal vom 17.12.2020, Amtliche Mitteilungen Nr. 110/2020“. **In case of differences in interpretation the German text is the only legally binding source of information.**

I. General regulations

§ 1

Aims of the degree program, purpose of examinations, admission requirements

- (1) The master's examination completes the master's degree program in Computer Simulation in Science with the degree Master of Science as a professional qualification. Successful graduates have applied in-depth knowledge of modelling, computer simulation and computer science, as well as programming and numerical algorithms, which are necessary for high-performance computing in the natural and engineering sciences. They will acquire the ability to create models (abstract problem formulation) and to interpret the results of a simulation or experiment and are able to independently adapt and further develop known methods and conceptualizations to new situations. They can recognize and define scientific and operational questions and problems, deal critically with research results and communicate them to others in an appropriate manner as well as solve problems in a team-oriented manner. They are able to develop new approaches of computer simulation in the natural and engineering sciences on their own responsibility.
- (2) Admission requirements to the study program Computer Simulation in Science with the degree Master of Science are as follows:
 1. A Bachelor's degree of at least 6 semesters in the subjects of applied natural sciences, chemistry, electrical engineering, financial mathematics, mechanical engineering, mathematics, physics, safety engineering or a related subject with a total of at least 180 ECTS credit points. In addition, applicants must have gained the following credit points (CP) either in, or transferable to, the following areas:

Knowledge of a programming language	8 CP	and
Atmospheric Physics: Experimental Physics (Mechanics, Electricity and Magnetism, Atoms and Molecules), Thermodynamics, Data Analysis and Statistics	24 CP	or
Computational Electromagnetics: Electromagnetics/Electromagnetic Theory, Applied Mathematics, Numerical Techniques in Engineering/Computational Engineering	24 CP	or
Computational Finance: Analysis I, II and III, Linear Algebra I and Introduction to Stochastic Calculus, Introduction to Numerical Analysis, Theory of Ordinary Differential Equations, Functional Analysis	24 CP	or
Computational Fluid Mechanics: Fluid Mechanics, Numerical Methods (or similar)	24 CP	or
Experimental Particle Physics: Mechanics, Electricity and Magnetism, Atomic Physics, Basic Quantum Mechanics, Nuclear Physics, Basics of Elementary Particle Physics	24 CP	or
Imaging in Medicine: Atomic Physics, Nuclear Physics, Basic Quantum Mechanics	24 CP	or
Materials Science: Physical Chemistry (including Introduction to Thermodynamics), Modern General Physics	24 CP	or
Theoretical Chemistry: Elementary Quantum Mechanics, Basic Electronic Structure Theory, Thermodynamics, Introduction to Reaction Kinetics, Physics for Chemistry Students	24 CP	or
Theoretical Particle Physics: Quantum Mechanics, Elementary Particle Physics, Theoretical Physics (Mechanics, Electromagnetism, Thermodynamics).	24 CP	

The recognition and transfer of credit points is decided by the examination committee. If an applicant's knowledge does not suffice to select one of the specializations, extra conditions may be specified in the admission letter. Mathematical knowledge at science or engineering bachelor's degree level is presupposed.

2. Adequate knowledge of English. Applicants whose mother tongue is not English, or whose first bachelor's degree (professional qualification) in accordance with no. 1 above was not gained in a program conducted in English must provide proof of their competence in English by
 - achieving a minimum of 79 points in TOEFL iBT (Internet-based) or
 - achieving 550 points in TOEFL PBT (Paper-based) or
 - achieving a band score of 6.0 in the IELTS test or
 - achieving the Cambridge Certificate in Advanced English (level 4) or
 - other proof of English language competence equivalent to level B2 of the Common European Framework of Reference for Languages.
- (3) On the basis of the documentation submitted, the examination committee decides on the admission to the master's program. In particular cases, students who received their qualification in a non-European country and who are not equated with Germans by or based on international agreements and whose education certificates do not allow the doubtless conclusion on compliance or non-compliance of the entry requirements acc. to para. 2, in accordance with § 49, para. 9 HG University and College Act might have to participate in an additional exam. In those cases the examination committee can ask for the proof of the ability to study in form of an oral examination of at least 30 minutes and utmost 45 minutes the result of which has to be documented in written form. The decision will be immediately communicated to the applicant in writing. If the application is rejected, reasons must be given and advice on applicable legal remedies must be provided.
- (4) If the premises for admission acc. to § 2 are not completely fulfilled, the examination committee can make admission to the master's program conditional on the gaining of extra credits and examination passes in the areas listed in section 2 no. 1 (extra conditions). The examinations committee may determine, in the notification of admission, a deadline by which these conditions must be fulfilled.
- (5) If, for reasons lying beyond the control of the applicant, the documentation required by section 2 is not yet complete, available items of documentary proof may be submitted individually. In this case the examinations committee can exceptionally grant admission to the master's program for a period of up to one semester after commencing the program, on condition that the required documentary evidence is supplied in full within that time (HG Act § 49, section 6, sentence 4).
- (6) Under the condition that this master's degree program is subject to an admission restriction (NC degree programs), § 4 and § 5 are not applicable.

§ 2

Degree awarded

The University of Wuppertal awards the degree of Master of Science (abbreviated MSc) to candidates who successfully pass the master's examination.

§ 3

Standard period of study and workload

- (1) The standard period of study of the master's degree program in Computer Simulation in Science, including the master's thesis, is four semesters.
- (2) The overall workload for the program, including contact hours, preparatory and complementary study and the master's thesis, comprises 120 CPs. A master's thesis counts for 30 CPs. One CP represents an average workload of 30 hours (ECTS credit points).

§ 4

Examination dates and deadlines

- (1) Examination dates must be arranged in a way that the master's program, including the thesis, can be completed within the standard period of study.
- (2) Examinations are generally to be completed before the end of the semester in question.

- (3) Registration for the restricted repeatable module examinations (§ 11) must take place at least three weeks before the respective examination date.
- (4) For exams offered as services from other departments/faculties, the service provider determines the registration period.

§ 5

Examination board

- (1) The examinations are organized by an examination board constituted by the Faculty of Mathematics and Natural Sciences. The committee consists of seven members: four professors, one non-professorial member of faculty, and two students. The chairperson, deputy chairperson and other members are appointed by the Faculty Board. Appointments are for an extendable two-year-term.
- (2) The examination board is an official body according to administrative procedural law and the code of administrative practice.
- (3) The examination board ensures that examination regulations are duly observed and that examinations are conducted in accordance with these regulations. It is in particular responsible for decisions in the event of objection to decisions taken in the course of examinations. The examinations committee reports regularly, and at least once a year, to the faculty about the development of examinations and the times taken to complete the degree program. This includes information about the actual time taken to assess and process the master's thesis, as well as the distribution of overall and individual subject grades. The report must be published by the university in a suitable manner. The examination board makes suggestions for the reform of the examination regulations and the degree program. The examination board can delegate performance of its regular tasks to the chairperson and deputy chairperson; this does not apply to decisions about objections or to the report to the faculty.
- (4) The examination board constitutes a quorum when, in addition to the chairperson or deputy chairperson and at least one other professor, at least a total of half the members entitled to vote are present. The board's decisions are taken by simple majority. In the event of parity of votes, the vote of the chairperson is decisive. Student members of the board participate actively in the evaluation, recognition, and transfer of course and examination credits, but not in decisions concerning academic subjects, examination questions, or the appointment of examiners and co-examiners.
- (5) Members of the examination board are entitled to be present at examinations.
- (6) Meetings of the examination board are not open to the public. Members of the board are bound to confidentiality by virtue of their office. Members who are not in public service must be bound to confidentiality by the chairperson of the examination board.
- (7) If the respective examination board agrees, expert guests can be admitted to their meetings. The guests are not entitled to vote, but are also bound to confidentiality.

§ 6

Examiners and co-examiners

- (1) The examination board appoints examiners and co-examiners. This task may be delegated to the chairperson. Examiners must possess at least a relevant master's degree or diploma degree or equivalent and, unless there are serious reasons to the contrary, have taught independently in the subject in question. Co-examiners must possess at least a relevant master's or diploma degree or equivalent.
- (2) In their function, examiners and co-examiners act independently.
- (3) The chairperson of the examination board will ensure that the names of the examiners are made known to the candidates at least four weeks before the date of the examination in question. A notice on the announcement board is sufficient.
- (4) Examiners and co-examiners are bound in accordance with § 5, section 6, sentences 2 and 3.

§ 7

Recognition and transfer of credits for academic courses completed and examination grades

- (1) Credits gained in a degree program at other state universities or state-approved higher educational institutions, at state or state-approved institutions of cooperative education or in study programs at foreign state or state-approved higher education institutions can be recognized upon application, if they do not substantially diverge in content and competencies from the credits they would replace. Credits recognized in this way will be transferred as course or examination credits to the modules listed in these examination regulations; they may also be transferred as modules in their own right to the elective area of the master's program. On application, other achievements and qualifications can be recognized up to a maximum of 50% of the course and examination credits. The recognition is thereby based on the documents submitted, if the achievements and qualifications are equivalent in content and level to the examination credits they are intended to replace.
- (2) The recognition and transfer of periods of study and course and examination credits gained at a foreign university must be regulated in accordance with the equivalence agreements adopted by the Standing Conference of Ministers of Education and Cultural Affairs and the University Rectors' Conference, as well as with university partnership agreements. In cases of doubt the University International Center, the Admission Office for International Students and the Central Office for Foreign Education may also be consulted.
- (3) The recognition and transfer of periods of study and course and examination credits gained in a state-approved distance learning university or in distance learning modules developed by the State of North Rhine-Westphalia in cooperation with the other German states and with federal authorities follow sections 1 and 2.
- (4) The examination board decides on the recognition and transfer in accordance with sections 1-3. Students must submit the documents required in the form determined by the examination board. The decision must be made within three months from the date all information required for the application in question has been submitted. The examination board can delegate the decision about recognition and transfer to the chairperson or deputy chairperson in charge.
- (5) When course or examination credits are transferred, the grades – insofar as the grading schemes in question are comparable – are to be transferred and included into the calculation of the final grade. If the grading schemes are not comparable, the credit will be transferred with the annotation "pass". The transfer will be noted in the certificate.
- (6) If the conditions stated in sections 1-3 are fulfilled, there is a legal right to transfer of credits.
- (7) If the recognition or transfer of credits is refused, reasons for this refusal must be given and the applicant must be informed in writing without delay and advice on applicable legal remedies must be provided.

§ 8

Default, withdrawal, deception, infringement of regulations

- (1) An examination will be deemed "failed" (grade 5.0) if the candidate fails to turn up for the examination without good reason, or withdraws without good reason after the examination has begun. The same holds if a written examination assignment is not submitted in due time. With the exception of the master's thesis, candidates can, without giving a reason, withdraw their registration for module examinations up to one week before the examination date.

- (2) Together with substantiating evidence the reasons given for withdrawal or default in accordance with section 1 sentences 1 and 2 must be submitted to the examination board in writing and without delay . If the reason given is sickness, the committee can require the candidate to submit a medical certificate confirming inability to sit the examination. In individual cases the chairperson of the examination board can require a medical certificate from an independent medical examiner designated by the committee. If the examination board does not accept the submitted reasons, this will be communicated to the candidate in writing.
- (3) If the candidate attempts to influence the result of her or his -examination by deception or by using unauthorized aids, the examination in question will be deemed failed (grade 5.0); the facts of the matter will be identified by the examiner and officially recorded by the examiner or invigilator. Moreover, in serious cases, or in the event of repetition, the examination board can, after consulting with the Faculty Board, declare prior examinations failed, or can revoke the right to repeat the examination and declare the entire examination definitively failed. A candidate who disturbs the orderly process of an examination in accordance with relevant regulations can, as a rule after due warning, be excluded from further participation in the examination by the examiner or invigilator. In this case the examination in question will be deemed failed (5.0). The reasons for the candidate's exclusion must be officially recorded. In serious cases the examinationboard can exclude the candidate from further examinations. Before a decision is made, the candidate must be given an opportunity to state her or his case.
- (4) Within 4 weeks candidates can require decisions made in accordance with section 3 sentence 1 and sentence 3 to be reviewed by the examination board .
- (5) Incriminating evidence must be communicated to the candidate in writing without delay, giving reasons and providing advice on applicable legal remedies.

II. Master's examination

§ 9

Admission to the examination

The master's examination is open to candidates who

- are enrolled in the master's degree program in Computer Simulation in Science at the University of Wuppertal, or as subsidiary students in accordance with the HE Act § 52 section 2 HG,
- have submitted a declaration that they have not definitively failed any examination required by these examination regulations , at a university within the domain of the German Constitutional Law, and that they are not currently involved in an examination procedure in the same degree program. The same applies for related or comparable degree programs.

§ 10

Nature and scope of the master's examination

- (1) The master's examination comprises successful completion of the modules and the master's thesis. Candidates who gain 120 credit points in the modules and module examinations as described below (see Annex) pass the master's examination. The module descriptions are a constitutive part of these examination regulations. Module examinations are taken on the basis of continuous assessment, i.e., at the end of each module. The examination board keeps account of the acquired credit points § 14 Para. 1) .
- (2) The master's examination comprises one compulsory subject and one area of specialization. A total of 74 credit points (CP) must be achieved in modules of the compulsory subject. Modules with credit points listed n brackets are compulsory elective modules (WP):

1. Computer Simulation:	36 CP
CSim1: Computer Simulation 1	11 CP
CSim2: Computer Simulation 2	13 CP
CSim3: Computer Simulation 3	12 CP

2.	Computer Science:	16 CP
	CS1: Computer Science 1	9 CP
	CS2: Computer Science 2	7 CP
3.	Numerical Methods:	22 CP
	NM1: Numerical Methods 1	8 CP
	NM3: Numerical Methods 3	6 CP
	<i>and optionally</i>	
	NM2a: Numerical Methods 2a	(8 CP)
	NM2b: Numerical Methods 2b	(8 CP)

An area of specialization must be chosen. In modules within the chosen area of specialization, 16 credit points (CP) are to be achieved at the candidate's choice. Modules with credit points listed in brackets are compulsory elective modules (WP).

A	Atmospheric Physics	
	AtmP1: Atmospheric Physics 1	8 CP
	<i>and optionally</i>	
	EAP: Introduction to the Atmospheric Physics	(8 CP)
	AtmP2b: Atmospheric Physics 2b	(8 CP)
B	Computational Electromagnetics	
	CEM1: Computational Electromagnetics 1	8 CP
	CEM2: Computational Electromagnetics 2	8 CP
C	Computational Finance	
	CompFin1: Computational Finance 1	8 CP
	CompFin2: Computational Finance 2	8 CP
D	Computational Fluid Mechanics	
	CFM1: Computational Fluid Mechanics 1	8 CP
	<i>and optionally two of the following modules</i>	
	CFM2: Computational Fluid Mechanics 2	(4 CP)
	CFM3: Computational Fluid Mechanics 3	(4 CP)
	CFM4: Computational Fluid Mechanics 4	(4 CP)
	CFM5: Computational Fluid Mechanics 5	(4 CP)
E	Experimental Particle Physics	
	SMTP: The Standard Model of Elementary Particle Physics	8 CP
	<i>and optionally</i>	
	COS: Cosmology and General Relativity	(8 CP)
	DET: Detector Physics	(8 CP)
	GETA: Foundations of Elementary Particle and Astroparticle Physics	(8 CP)
F	Medical Imaging	
	IMG1: Imaging 1	8 CP
	<i>and optionally</i>	
	IMG2: Imaging 2	(8 CP)
	DET: Detector Physics	(8 CP)
G	Materials Science	
	SMwM: Statistical Mechanics of Soft Matter	8 CP
	NMvM: Numerical Methods for Physics of Soft Matter	8 CP
H	Theoretical Chemistry	
	TC1: Theoretical Chemistry 1	8 CP

TC2: Theoretical Chemistry 2

8 CP

I Theoretical Particle Physics

One of the modules

SMTP: The Standard Model of Elementary Particle Physics (8 CP)

VTT: Many Body Theory (8 CP)

SFT: Statistical Field Theory (8 CP)

and one of the modules

COS: Cosmology and General Relativity (8 CP)

EQFT: Introduction to Quantum Field Theory (8 CP)

FQM: Advanced Quantum Mechanics (8 CP)

- (3) On the basis of the module descriptions provided (annex) a module reference book is issued. The module reference book contains obligatory information as well as details about
- the learning outcomes to be achieved,
 - the structuring module components, especially descriptions of contents, the form and extent of the courses, and, if applicable, the reference to compulsory attendance including the required scope of participation in the courses,
 - the distribution of workloads for preparation and follow-up in order to participate at the individual module components,
 - the compulsory or recommended requirements to participate in courses and examinations,
 - the choice between alternative module components,
 - the workload of the module examinations and the ungraded assignments if this is not included in the stated workload of the module components,
 - additional information describing the course of study and the examinations in more detail.
- The module reference book has to be published in an appropriate manner. It can be adjusted if necessary and in consideration of the guidelines of § 2 and the module descriptions (annex).

§ 11

Examinations, proof of achievement, credit points

- (1) In the module examinations, the candidates should demonstrate the learning outcomes acquired. They are conducted in accordance with the module descriptions (annex).
- (2) Credit points are assigned to the individual modules. They are awarded when all examinations of the module have been completed and therefore the respective module has been completed. Graded modules are graded in accordance with § 16 section 1.
- (3) Examinations which, according to the module descriptions, can only be repeated a limited number of times must be assessed by two examiners. This is not necessary if a candidate, who fails the examination, will be allowed at least one further attempt. The grade awarded is the arithmetic mean of the grades proposed by the individual examiners.
- (4) The grade awarded in written examinations in accordance with section 2 must be communicated to the candidate within 6 weeks at the latest.
- (5) According to the relevant module description (see annex), examinations of section 3 may be repeated once or twice when failed or deemed failed. The final thesis can only be repeated once. An examination that has been passed cannot be repeated.
- (6) The form in which ungraded assignments can contribute to the assessment of a module must be determined by the instructor when announcing the course, unless the examination regulations or module descriptions determine otherwise. Examiners and instructors are urged to ensure that the workload for ungraded assignments and their preparation time does not exceed the workload determined for the acquisition of credit points.

- (7) An examination is always held in the language of the associated course. The candidate is not entitled to write the examination in a language other than that of the associated course. On application, the examination can be written or held in another language at the candidate's choice with the consent of the examination committee.

§ 12

Compensation for disadvantage

- (1) The chairperson of the examination board must allow candidates who submit a physician's certificate attesting that because of sustained or chronic physical disability they are unable to take the examinations wholly or partly in the set form to take an equivalent examination in another form. The same applies to course assignments.
- (2) For seriously disabled candidates as defined by Social Code IX, for the physically disabled, and for the chronically sick, exceptions must be made to the provisions of the examination regulations and organizational requirements and deadlines, taking appropriate account of the disability or chronic sickness in question. Applications for such exceptions must be submitted at the time of registration for the first module examination.
- (3) For candidates covered by the provisions of §§ 3, 4, 6 and 8 of the Maternity Protection Act, or of the Parental Allowance and Parental Leave Act, the examination conditions as laid down in these regulations must, upon application by the candidate, be determined by the examinations committee, with regard to the individual case.

§ 13

Types of examination

Examinations can be taken in the following regulated types in accordance with the module description. If module descriptions provide for alternative types of examination, the type of examination shall be determined in accordance with the module description.

1. Oral examinations

- a) Oral examinations seek to determine whether candidates can address and present issues from the examination subject, and relate to and answer specific questions in this area.
- b) Oral examinations must be conducted individually by an examiner in the presence of a co-examiner who is versed in the subject. The presence of a co-examiner is not necessary if a candidate who fails the examination will be allowed at least one further attempt. Moreover, if the legal acceptability of the examination is not assured, oral examinations must always be held jointly by several examiners or by one examiner in the presence of a co-examiner who is versed in the subject. The duration of oral examinations must be set in the module descriptions as between 20 and 60 minutes.
- c) The examiner must determine the grade of the oral examination in accordance with § 16 section 1 on the basis of the candidate's overall performance, consulting the co-examiner beforehand.
- d) The main points and results of the examination must be put on file. Candidates must be told the result of the examination immediately afterwards.
- e) If there is enough space, students who intend to take the same examination at a later date must, unless the candidate objects, be admitted to the examination as auditors. This does not entitle them to attend the examiners' consultation or the communication of the results of the examination.

2. Invigilated written examinations

- a) Invigilated written examinations seek to determine whether candidates can, within a restricted time and with restricted aids, complete a task appropriate to the requirements of the degree program. The duration of written examinations must be set in the module descriptions as between 60 and 240 minutes. Tasks must be set in a way that they test basic knowledge of the content and methods of the subject, as well as the ability to apply knowledge to a specific issue.
- b) Invigilated written examinations must be assessed by two examiners. This is not necessary in the case of module examinations where a candidate who fails will be allowed at least one further attempt. Assessment is in accordance with § 16 section 1.
- c) If the written examination is assessed by several examiners, the grade awarded is the arithmetic mean of the grades proposed by the individual examiners. The assessment must be communicated to the candidate within 6 weeks of the date of the examination. Candidates must be given the opportunity to inspect their examination papers within one month of the grading of the assessment.

3. Written assignments

- a) Examinations in the form of written assignments seek to determine whether, within a restricted time and in terms of content as well as method, candidates can independently complete a task appropriate to the requirements of the degree program, and can present the result in a scientifically and linguistically appropriate manner. The topic, length, and time allotted for completion of the written assignment must be determined by an examiner.
- b) Examinations in the form of written assignments must be assessed by two examiners. This is not necessary in the case of module examinations where a candidate who fails will be allowed at least one further attempt. Assessment is in accordance with § 16 section 1.
- c) If a written assignment is assessed by several examiners, the grade awarded is the arithmetic mean of the grades proposed by the individual examiners. The assessment must be communicated to the candidate within 6 weeks of the submission deadline. Candidates must be given the opportunity to inspect their written assignment within one month of the date of announcing the assessment.

4. Electronic examinations

- a) An "e-examination" is an exam which is created, executed, and assessed computer-assisted (with the exception of the open questions). An "e-exam" is admissible if it is possible to prove that the examinee masters the contents and methods of the module in important correlations and is able to apply the achieved knowledge and skills; if necessary, it can be supplemented by other examination forms.
- b) The "e-exam" has to be conducted in the presence of a professional qualified person (minute taker). A record has to be prepared about the course of the exam, which includes at least the name of the minute taker as well as of the examinees, start and end of the exam and probably particular incidents. It must be guaranteed that the electronic data can be clearly and permanently assigned to the examinees. According to the regulations of § 21 the examinees must be granted the chance to inspect the computer-assisted exam as well as the achieved result.
- c) The students must be given the opportunity to become acquainted with the examination regulations and the examination system before taking the exam.
- d) Examinations in form of electronic examinations have to be assessed by two examiners. This might be deviated if in case of failure of the particular module exam there is at least one possibility of repetition. The assessment is made according to § 16 section 1.
- e) In the case of an assessment by several examiners the grade of the electronic examination is based on the arithmetic average of the grades given by the two examiners. The announcement of the assessment is made within 8 weeks after the examination date. Within one month after the announcement of the assessment the examinees must be given the opportunity to have access to their electronic assignments.

5. Multiple-Choice Examinations

- a) In the case of “multiple choice examinations”, the examinee shall resolve questions posed in writing under supervision by indicating the correct answers from a catalogue of given possible answers. The multiple-choice procedure is used in suitable modules at the request of the examiners and with the consent of the examination board.
- b) The examination questions must be based on the knowledge and qualifications to be imparted by the module in question and enable reliable examination results to be obtained.
- c) The examiners determine the examination tasks, including the examination questions and the specified answer options. It must be recorded in writing which of the possible answers are accepted as the correct answer to the examination questions.
- d) The examination is passed if the examinee has answered correctly at least 60 % of the examination questions asked or if the number of questions answered correctly by the candidate is not more than 15 % lower than the average examination performance of the candidates who took the examination for the first time in the previous comparative period comprising three examination dates.
- e) The performance in the written examination shall be assessed as follows: If the minimum number of correctly answered examination questions required to pass and referred to in (d) has been reached, the mark shall be as follows:

excellent	(1,0)	if at least 98 %,
	(1,3)	if at least 93 % to 97 %,
good	(1,7)	if at least 89 % to 92 %,
	(2,0)	if at least 85 % to 88 %,
	(2,3)	if at least 81 % to 84 %,
satisfactory	(2,7)	if at least 77 % to 80 %,
	(3,0)	if at least 73 % to 76 %,
	(3,3)	if at least 69 % to 72 %,
passed	(3,7)	if at least 65 % to 68 %,
	(4,0)	if at least 60 % to 64 %

of the examination questions asked were answered correctly.

The grade is 'insufficient' (5,0) if the required minimum number of examination questions correctly answered according to point (d) has not been reached. If the minimum pass mark deviates from 60 %, the percentage points must be adjusted proportionally.

- f) The assessment of the examination shall include the following information:
 - 1. the number of examination questions asked and the number of examination questions answered correctly by the candidate,
 - 2. the required minimum number of examination questions to be answered correctly (pass mark),
 - 3. in the case of passing, the percentage by which the number of correctly answered questions exceeds the minimum requirements,
 - 4. the mark obtained by the examinee.
- g) When evaluating the examination results, the examiners must pay attention to whether, due to the accumulation of incorrect answers to certain examination questions, there are indications that the examination task was formulated incorrectly. If, after the examination has been taken, it appears that individual questions or possible answers have been formulated incorrectly, the relevant examination tasks are deemed not to have been performed. The number of tasks shall be reduced accordingly; the evaluation shall be based on the reduced number of tasks. The reduction in the number of examination tasks must not be detrimental to the examinees.

6. Presentation with colloquium

- a) In examinations consisting of a presentation with colloquium, it is to be determined whether the candidate is able to work on and explain a technical or practical topic independently and to present, defend, and discuss it argumentatively with or to an audience of professors and fellow students.
- b) The provisions of points 1(b) - (e) shall apply accordingly.

7. Portfolios

- a) In portfolios the candidate completes several tasks spread over one or more semesters by compiling practical exercises, minutes, lectures, or other assignments that are related to several different module components belonging to a single module and/or courses.
- b) The individual components of the portfolio are evaluated and assessed by an examiner appointed in accordance with § 6. Beyond this form of the assessed portfolio and in accordance with the regulations laid down elsewhere in the examination regulations, the module descriptions can determine that the assessment and evaluation of the entire portfolio is linked to a final individual performance in the form of either an oral examination, a written examination (Klausur) or a term paper. The grade awarded in accordance with § 16 covers all the assignments completed within the framework of the portfolio, including (where applicable) the concluding examination mentioned above.
- c) The module descriptions may determine that the individual components of the portfolio undergo prior non-binding evaluation and assessment by the relevant instructor, who is appointed as an examiner for this purpose in accordance with § 6. So long as the number of individual assignments in the portfolio does not exceed the number of components in the module, the module descriptions may also determine that this prior assessment be documented for the examinations committee, which will make it available to the examiner for the final overall evaluation and assessment of the portfolio.
- d) If no provisions about the form, the allotted time and/or the documentation of the individual assignments are made in the module descriptions, the examinations committee will announce in due time, as a rule at the beginning of the teaching semester at the latest, the form and deadlines applicable to the individual portfolio assignments, how they are to be documented, and (where applicable) the form of prior assessment to be made by the instructor appointed to examine them.
- e) If an examination in the form of a portfolio has to be repeated, the examiner appointed for the overall evaluation and assessment will determine and put on file which individual components of the portfolio need not be repeated. These components must be resubmitted for the repeated overall evaluation and assessment.

8. Integrated examinations

- a) In integrated examinations, it is to be determined whether the candidate can solve a task corresponding to the requirements in a limited period of time and subsequently present the result in the context of the subject area as well as classify and answer special questions in this context.
- b) The candidate will be informed of the task in writing four weeks before the examination date in order to prepare a presentation. The integrated examination includes a free presentation spoken without notes, which is immediately followed by an oral examination part according to No. 1 (b) to (e).

9. Practical examinations

Practical examinations are used to determine whether the examinee has the necessary practical qualifications in the relevant subject area. The examination shall be designed in such a way that it covers both the practical and oral presentation as well as the written preparation of a paper under supervision. Clauses 1 and 2 shall apply accordingly.

§ 14

Credit points account and recording of credit points

- (1) The examination committee opens a credit point account for each candidate. The account records credit points gained and grades awarded for the module examinations and master's thesis (§ 10 section 1). Students' individual performance is communicated by the examiners to the students in a form determined by the examinations committee, or communicated to the examinations committee. If feasible, candidates can inspect their credit point accounts.
- (2) The entitlement to credit expires at the time when the candidate registers for the examination and thereby starts the examination procedure.
- (3) Credit points cannot be credited more than once onto the account towards the degree of Master of Science within the degree program Computer Simulation in Science.

§ 15

Master's thesis

- (1) The master's thesis is meant to determine that candidates' ability to master their subject and to address a problem from that subject area independently and scientifically within a set time and to present the result in an appropriate manner in terms of subject matter and linguistic expression. A prerequisite for the issue of the topic of the master's thesis is the proof of at least 70 credit points according to § 10 as well as the successful completion of the modules "CSim1 Computer Simulation 1" and "CSim3 Computer Simulation 3" and of at least one module in the selected area of specialization. The master's thesis must be written in English.
- (2) The topic of the master's thesis is set by the examiners appointed by the examinations committee in accordance with § 6 section 1. The thesis is supervised by these examiners. Candidates must be given an opportunity to suggest a topic for the master's thesis.
- (3) The chairperson of the examinations committee will, upon application by the candidate, ensure that a topic is set in due time.
- (4) The topic for the master's thesis is issued by the chairperson of the examination board upon application by the candidate. The date of issue must be put on file.
- (5) The time allotted for the master's thesis is 6 months. The topic and task must be set in a way that the deadline can be kept. The topic can only be rejected once and only within the first 4 weeks of the allotted time. In exceptional cases and on reasonable application by the candidate, the examinations committee can extend the allotted time once by a period of up to 12 weeks.
- (6) When submitting their master's thesis, candidates must provide written assurance that they have written the thesis independently themselves, using only the sources and aids documented therein, and that they have indicated all quotations as such.

- (7) Three copies of the master's thesis must be submitted to the examination board within the deadline; the date of submission must be put on record. In order to check for plagiarism, an electronic version of the thesis and of any empirical data used therein must be submitted, along with the printed version, in a format to be agreed with and onto a medium to be determined by the examination board. If the master's thesis is not submitted within the deadline, it will be deemed failed (grade 5.0) in accordance with § 8 section 1 sentence 2.
- (8) The master's thesis must be assessed and graded by two examiners. One of the examiners should be the person who set the topic and supervised the thesis. The second examiner will be appointed by the chairperson of the examination board. The supervisor of the thesis may propose the second examiner. Each assessment must be executed in accordance with § 16 section 1, giving reasons in writing. Provided that the difference between the individual grades awarded is not greater than 1.0, the grade awarded for the master's thesis will be the arithmetic mean of the grades proposed by the individual examiners. If the difference is greater than 1.0, the examinations committee will appoint a third examiner to assess the thesis. In this case the grade awarded for the master's thesis will be the arithmetic mean of the two better grades proposed. The master's thesis can, however, only be deemed "passed" or better if at least two of the grades awarded are "passed" or better. If the final grade awarded for the thesis is not at least "passed", the candidate has failed and the master's thesis must be repeated.
- (9) The master's thesis can be repeated once. In this case candidates will be set a new topic. Rejection of the topic for the second master's thesis within the deadline named in section 5 sentence 3 is, however, only permissible if candidates have not availed themselves of this opportunity when preparing their first master's thesis.
- (10) The assessment of the master's thesis must be communicated to candidates 8 weeks after submission of the thesis at the latest.
- (11) The workload of the final thesis is credited with 30 credit points.

§ 16

Assessment, grades & master's examination

- (1) Grades for individual elements of the examination will be awarded by the examiner in charge. The following grades are awarded

1 = excellent	= an outstanding performance;
2 = good	= a performance considerably above average requirements;
3 = satisfactory	= a performance that meets average requirements;
4 = passed	= a performance that despite its shortcomings still meets requirements;
5 = failed	= a performance that because of serious shortcomings no longer meets requirements.

In order to achieve a more differentiated assessment of the examination performance, intermediate grades can be awarded by raising or lowering the individual grades by a ratio of 0.3. However, the grades 0.7, 4.3, 4.7 and 5.3 are not permissible.

- (2) The module grades are as follows:

average grade up to 1.5	= excellent
average grade greater than 1.5 through 2.5	= good;
average grade greater than 2.5 through 3.5	= satisfactory;
average grade greater than 3.5 through 4.0	= passed,
average grade greater than 4.0	= failed.

When calculating a module grade, only the first decimal place after the comma is taken into account; all other places will be deleted without rounding.
- (3) The final grade of the master's examination is the arithmetic mean of the module grades together with the grade of the master's thesis, weighted according to credit points. In calculating the overall grade, only the first decimal place is taken into account; all further decimal places are ignored without rounding up or down. The final grade of a successful master's examination is as follows:

average up to 1.5	=	excellent;
average grade greater than 1.5 through 2.5	=	good;
average grade greater than 2.5 through 3.5	=	satisfactory;
average grade greater than 3.5 through 4.	=	passed.

- (4) If the master's thesis is assessed with the grade 1.0 and the average of all other grades of the master's examination is not worse than 1.3, the overall assessment awarded will be "passed with distinction" instead of "excellent" as indicated in section 3.

§ 17

Supplementary credits

- (1) Candidates can complete more modules than those mandatory.
- (2) Supplementary credits can be gained by successfully completing extra modules of this master's degree program. Successfully completed modules of other degree programs can only be counted as supplementary credits with the agreement of the examination board. Supplementary credits will be included in the examination certificate upon application. These supplementary credit points and grades will not be counted in the calculation of the overall grade of the master's examination.

§ 18

Examination certificate

- (1) A certificate testifying the successfully completed master's examination and indicating the individual module grades, the overall grade, the grade and topic of the master's thesis will be issued without delay and, if possible, within four weeks after allocating the final credit points. Supplementary credits (where accepted), as well as the time taken to complete the degree program including the master's examination can also be indicated on the certificate upon the candidate's application. The certificate must be signed by the chairperson of the examinations committee. The certificate will be dated to the day on which the last credit points were awarded.
- (2) If the master's examination is, or is deemed to be definitively failed, the chairperson of the examination board will notify the candidate of this in writing.
- (3) Notification of definitive failure of the master's examination must be accompanied by an advice on applicable legal remedies.
- (4) Candidates who fail the master's examination will, upon application and submission of relevant proof, be provided with a written document that indicates their examination performance, grades and number of examination attempts as well as the credit points still required to pass the master's examination, and also makes clear that they have not passed the master's examination.

§ 19

Master's degree certificate

- (1) At the same time, and bearing the same date as the examination certificate, candidates will be given their master's degree certificate. This formally attests the award of the master's degree in accordance with § 2.
- (2) The master's degree certificate will be signed by the dean of the School of Mathematics and Natural Sciences and the chairperson of the examination committee, and will bear the school's seal.
- (3) The University of Wuppertal issues a Diploma Supplement (DS) in accordance with the "Diploma Supplement Model" of the European Commission, the Council of Europe and UNESCO/CEPES. The presentation of the national educational system (DS section 8) follows the text agreed by the Standing Conference of Ministers of Education and Cultural Affairs and the University Rectors' Conference in its currently valid form. In addition to the Diploma Supplement, the University of Wuppertal will provide English translations of the examination and master's degree certificates upon application by the candidate.
- (4) The grade distribution table of the study program Computer Simulation in Science with the degree Master of Science is presented in a table format according to the specifications of the ECTS guide in the currently valid version.

III. Final regulations

§ 20

Invalidity of the master's examination, revocation of master's degree

- (1) If a candidate has cheated in obtaining the CP and this fact becomes known after the certificate has been issued, the examination board can subsequently correct the grades for those performances in which cheating occurred and declare the examination failed in whole or in part.
- (2) If the requirements for admission to the acquisition of CPs were not fulfilled without the candidate intending to deceive, and if this fact only becomes known after the certificate has been issued, this defect is remedied by the successful acquisition of the CPs. If the candidate has intentionally obtained admission unlawfully, the examination board shall decide on the legal consequences in compliance with the Administrative Procedure Act for the State of North Rhine-Westphalia.
- (3) Before a decision is taken, the parties concerned shall be given the opportunity to comment on the issue.
- (4) The incorrect certificate shall be withdrawn and, if necessary, a new certificate shall be issued. A decision in accordance with § 1 and § 2 sentence 2 is excluded after a period of three years after the certificate was issued.
- (5) If the examination as a whole has been declared failed, the master's degree shall be withdrawn and the master's certificate confiscated.

§ 21

Inspection of the examination files

After individual examinations, students may inspect their examination papers, evaluations and assessments upon application, which has to be put forward within one month of the announcement of the examination results. The examination board decides on the details.

§ 22

Transitional provisions

These examination regulations apply to all students who are enrolled in the master's program Computer Simulation in Science with the degree Master of Science starting in the winter semester 2020/21 and have not yet studied at the University of Wuppertal before.

Students who began their studies according to the examination regulations of 19 May 2014 (Official Announcement 29/14), last amended on 15 July 2019 (Official Announcement 36/19), can take their module examinations, including the final thesis, until 30 September 2022, unless they apply to the examination board for these new examination regulations to be administered. The application to proceed under the new examination regulations is irrevocable.

§ 23

Promulgation and publication

These examination regulations come into force on the day after their publication in the Official Bulletin of the University of Wuppertal.

Executed in accordance with the resolution of the Faculty Board of the School of Mathematics and Natural Sciences dated 21 October 2020.

Dated Wuppertal, XX- XX- 2022

The Rector
of the University of Wuppertal
Professor Dr. Dr. h.c. Lambert T. Koch

