Please note that this document is a non-binding convenience translation. Only the German version of the document entitled "Prüfungsordnung der Universität Heidelberg für den Master-Studiengang Angewandte Informatik", dated 22 July 2010 (published in the President's bulletin [Mitteilungsblatt des Rektors] of 30 August 2010, p. 1233), last amended on 07 February 2013 (President's bulletin [Mitteilungsblatt des Rektors] of 28 February 2013, p. 59), has legal validity.

Heidelberg University examination rules and regulations for the Master's degree programme in Applied Computer Science

Date: 22 July 2010

Section I: General provisions

Section II: Master's degree

Section III: Final provisions

Section I: General provisions

§ 1 Purpose of the academic programme and examination

The consecutive, research-oriented Master's degree programme in Applied Computer Science conveys in-depth specialist knowledge and an understanding of the scientific methods employed in computer science as well as, according to the interests of the student, in additional subject areas.

(1) The purpose of the Master's examinations is to assess whether students have an overview of the interconnections within their subject, have the ability to apply in-depth academic methods and knowledge, and are able work independently in accordance with academic principles.

(2) Admission to the academic programme is subject to separate admissions regulations.

§ 2 Master's degree

After successful completion of the Master's examinations, Heidelberg University awards the academic degree of "Master of Science" (abbreviated "M.Sc.").

§ 3 Standard period of study, programme structure and range of courses offered

(1) The standard period of study for the Master's degree programme is four semesters, including examinations. This includes completion of the Master's thesis.

(2) The Master's degree programme in applied computer science is organised in modules.
Credits are allocated to the modules. In total, 120 credits must be collected, 72 of which must be collected in Computer Science and 18 in the application area. 30 credits are allocated to the Master's thesis. The compulsory and compulsory elective modules in Computer Science are listed in Attachment 2; the sequence in the model syllabus (Attachment 1) should be used for orientation purposes. In addition to the modules listed in Attachment 2, other modules for the Master's degree programme may be taken into account if the modules if they are complementary in terms of content. The examinations board makes the decision on recognition of modules not listed in Attachment 2. Students must ensure that they do not select modules that were already completed in the Bachelor's degree programme.

(3) The Master's degree programme in applied computer science includes an application area. All possible application areas are listed in Attachment 3. An application area not listed in Attachment 3 may also be approved upon

application to the examinations board.

(4) Examination prerequisites are graded with credit points in accordance with the European Credit Transfer System. One credit corresponds to a workload of approx. 30 hours. Credits are only awarded for successfully completed (but not necessarily graded) components. If a component is graded, it must be awarded at least a “sufficient” grade (4.9) or higher in order to obtain credits.

(5) Courses and examinations in the degree programme are mainly held in German, however, some are also held in English.

(6) If the candidate does not fully complete the Master's examination by the end of the sixth academic semester, he/she must participate in a consultation session with an academic advisor at the beginning of each subsequent semester. A confirmation must be presented every semester. If the candidate does not present such a confirmation, he/she will lose the entitlement to take the examination unless he/she is not responsible for exceeding the deadline.

§ 4 Examinations board

(1) The examinations board organises examinations and tasks defined in these examination rules and regulations. It is made up of three professors or lecturers, a representative of the research assistants, and a student with advisory authority.

(2) The chairperson of the examinations board, the deputy chairperson as well as other members and their deputies are appointed by the faculty council. The chairperson and the deputy must be professors or lecturers. The examinations board student member and his/her deputy is appointed by the faculty council based on a proposal from the departmental student committee.

(3) The members are appointed for three years; the student member is appointed for one year. Members may be re-elected.

(4) The examinations board ensures that the examination rules and regulations are upheld. On a regular basis, the board reports to the faculty regarding changes to examinations, study periods and grading. This report is published in a suitable form.

(5) The chairperson manages the business of the examinations board, prepares and chairs the meetings and, in the event of a tie vote, has the deciding vote. The examinations board may confer further responsibility to its chairperson. Such a decision may be revoked at any time.

(6) Examinations board members have the right to attend examinations.

(7) Members of the examinations board and their deputies are subject to official secrecy. Those who are not civil servants are sworn to secrecy by the

chairperson.

§ 5 Examiners and observers

(1) Following consultation with the examinations board, the chairperson appoints the examiners and observers for all examination components. Examiners must be lecturers in the Master's degree programme in Computer Science.

(2) In general, university examinations which are not completed during the course of study may only be conducted by professors, lecturers, associate professors, or research associates who have been granted examination rights by the President due to longstanding teaching experience.

(3) In general, the lecturer for the respective lecture or course is responsible for examination components completed during the course of study.

(4) Observers must have passed the Master's examination or at least an equivalent final examination.

(5) For examiners and observers, § 5 Section 7 (official secrecy) shall apply accordingly.

§ 6 Recognition of course credits, examination results and academic degrees

(1) Examination prerequisites and results, as well as academic degrees obtained in degree programmes at German universities or universities of cooperative education (state or state-recognised), or at foreign universities (state or state-recognised), will be recognised as long as there is no significant difference concerning the skills acquired, courses taken and degree obtained in the programme. This recognition is required in order to continue an academic programme, take examinations, enrol in a further academic programme or be admitted to a doctoral programme. The validity of § 15, Sections 3 and 4 LBG (State Public Service Law) remains unaffected.

(2) Preliminary and intermediate examinations taken at other German universities in the same degree programme or in a similar degree programme will be recognised. Courses completed at recognised distance-learning institutions will be considered equivalent to those in a corresponding traditional degree programme with regard to determining the duration of study.

(3) It is the applicant's responsibility to provide all information necessary for achievements to be recognised. It is the responsibility of the office that carries out the recognition procedure to prove that an application does not fulfil the requirements.

(4) If agreements exist between the Federal Republic of Germany and other

states concerning equivalent university degree programmes (Equivalency Agreements) that favour students from other states by way of derogation from Section 1 and § 29, Section 2, clause 5 of the LHG (Act on Higher Education of the Land of Baden-Württemberg), the rules and regulations in the Equivalency Agreement take precedence.

(5) Examination results are to be graded on the basis of a credit point system that allows for achievements in equivalent or similar degree programmes to be recognised; this also applies to universities of cooperative education, provided that there is equivalence.

(6) Knowledge and skills gained outside a university degree programme may be recognised in such a programme, as long as

1. the requirements for university admission are fulfilled at the time of recognition,
2. the knowledge and skills to be recognised for the university degree programme are equivalent in both content and level to the course credits and examinations which they should replace, and
3. the criteria for recognition have been verified through accreditation.

Knowledge and skills gained outside a university degree programme may not replace more than 50% of the university degree programme. Universities shall specify the details of the examination rules and regulations, in particular the extent to which knowledge and skills gained outside a university degree programme can be recognised and the preconditions that must be fulfilled. The examination rules and regulations may require the completion of a placement test.

(7) In case of refresher courses, credits may be given for courses and examinations. When recognising credits from refresher courses for a university degree programme, Sections 2 and 5, as well as Section 6 Clause 1 No. 1 apply accordingly. When recognising knowledge and skills gained outside a university degree programme for refresher courses, Section 6 applies accordingly.

§ 7 Unexcused absence, withdrawal, deception and breaches of regulations

(1) An examination is graded as "failed" (5.0) if candidates fail to appear without being able to state a valid reason for their absence, or if they withdraw after the examination has started. The same applies if the candidate fails to complete a written examination within the established timeframe, unless the candidate is not at fault for exceeding the deadline.

(2) Plausible reasons for withdrawal or absence must be immediately addressed, in writing, to the examinations board. If the candidate, or a child for whom the candidate is generally the sole carer, is ill, a medical certificate must be provided. In case of doubt, the University may request a medical certificate from a doctor of its choice. If the reasons are accepted, a new appointment will be scheduled. In this case, examination results that are already available will

be taken into account.

(3) When deciding whether the candidate is at fault for exceeding a deadline for registration, or taking an examination, the examinations board must respect the provisions stated in the Maternity Protection Act and the legal regulations concerning parental leave, and allow candidates to make appropriate use of these provisions.

(4) If the candidate tries to influence the examination results through deception or by using unauthorised aids, the examination component in question will be graded as "failed" (5.0). If a candidate disrupts the proper course of the examination, the examiner or examination supervisor may exclude the candidate from continuing the examination. In this case, the examination result will be graded as "failed" (5.0). In extreme cases, the examinations board may exclude the candidate from all further examinations.

(5) Within a period of 14 days, the candidate may request that the decision in accordance with Section 4 Sentences 1 and 2 be validated by the examinations board. The candidate must be informed of negative decisions immediately and in writing; the reasons for the decision must be stipulated and information on the procedure for appeal must be provided.

§ 8 Types of examination components

(1) The examination components are:

1. oral examination components completed during the course of study
2. written examination components completed during the course of study (electronically where applicable)
3. the Master's thesis

(2) If candidates provide a medical certificate which credibly proves that they are not able to take examination components completely or partially in their intended form, due to long-term or permanent health problems, the examinations board may allow them to take an equivalent examination. The same applies for other course requirements.

§ 9 Oral examination components completed during the course of study

(1) In oral examination components, candidates are required show that they are able to identify interconnections within the subject of the examination and relate specific problems to these interconnections.

(2) In general, oral examination components are conducted by one examiner and one qualified observer.

(3) An oral examination lasts between 30 and 60 minutes.

(4) All significant content, and the result of the oral examination, must be recorded in the minutes. Candidates must be notified of examination results immediately following the oral examination.

(5) Students wishing to take a subject examination at a later date, should be permitted to listen in on the same examination, if room is available. The audience may not be present for assessment or announcement of the examination results. Listeners can be prohibited from attending upon the candidate's request or for other valid reasons.

§ 10 Written examination components completed during the course of study

(1) In written examination components, candidates are required to prove that they are able to recognise problems relating to their subject and find solutions for them, using subject-specific methods with limited time and resources.

(2) A written examination may last between 45 and 180 minutes.

(3) If a written examination is taken as a term paper, candidates must assure that they are the authors of their work and have used no sources or aids other than those indicated.

(4) The evaluation period for written examinations completed during the course of study should not exceed two weeks.

§ 11 Assessment of examination components

(1) Grades for the individual examination components are determined by the respective examiners. The following grades must be used for assessment of examinations:

1 = very good	=	an outstanding performance;
2 = good	=	performance which lies substantially above average requirements;
3 = satisfactory	=	a performance which corresponds to average requirements;
4 = sufficient	=	a performance which, despite deficiencies, still meets the requirements;
5 = failed	=	a performance which does not meet the requirements due to considerable deficiencies.

For more detailed assessment of examination results, grades may be further differentiated by increasing or decreasing the individual grades by 0.3; however, the grade 0.7 and incremental grades above 4.0 may not be applied.

(2) Students receive a passing grade in an examination component if it has been graded as "sufficient" (4.0) or higher.

(3) Module examinations may consist of several sub-module examinations.

(4) The module grade is calculated with the help of the sub-module examination grades averaged according to their credits.

(5) When calculating final module grades and the overall examination grade, only the first digit after the decimal point is taken into account. The other digits are dropped without rounding.

(6) If grades are awarded in accordance with the European Credit Transfer System ECTS, the international assessment standard specified in Attachment 4 is applied.

(7) Individual modules may not require a grade; in these cases students can merely "pass" or "fail" the module. In these cases, the result is not included in the calculation of the overall grade.

§ 12 Retaking examination components

(1) If examination components are not passed or considered not to have been passed, they may be retaken once. This includes failed examinations at other universities.

(2) Retaking an examination that has been graded as passed is not permitted.

(3) If an examination component is failed, it must be retaken within a period of one year. If candidates miss this deadline, they may not retake the examination component, unless they are not responsible for exceeding the deadline.

(4) A second retake is permitted only under exceptional circumstances and only for a maximum of two modules. The examinations board makes the decision to grant permission for a second retake upon written application. A second retake is not possible for the module Master's thesis. If an examination component in a compulsory elective module is failed at the final attempt, this module may be compensated for with a further compulsory elective module.

Section II: Master's examination

§ 13 Scope, nature and organisation of the Master’s examination

(1) The Master's examination consists of:
1. examination components completed during the course of study in the modules, in accordance with Attachments 1 to 3

2. the Master's thesis

(2) The examinations referred to in Section1, No. 1 are taken as an integrated part of the respective lectures or courses. They may be in written or oral form. The lecturer responsible for a lecture or course determines the nature and duration of the integrated examinations and provides this information no later than at the beginning of the lecture or course.

§ 14 Admission requirements and procedure

(1) Admission to the individual examination components is only authorised for students who:
1. are enrolled in the Master's degree programme Applied Computer Science at Heidelberg University,
2. have not lost their entitlement to take the final examinations in the Master's degree programme Applied Computer Science, in other degree programmes with comparable content, or in the teaching degree programme Computer Science.

(2) Candidates who have completed examination prerequisites worth a total of 45 credits may be approved for the Master's thesis.

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(3) The application for presentation of the Master's degree must be made in writing and addressed to the chairperson of the examinations board. The following must be enclosed with the application:

1. evidence of fulfilment of the admission requirements in accordance with Sections 1 and 2;
2. a declaration stating that the candidate has not lost his/her entitlement to take the final examinations in the Master's degree programme in Computer Science, in other degree programmes with comparable content, or in the teaching degree programme Computer Science.

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(4) The chairperson of the examinations board makes the decision on the application. Denials must be made in writing, stating the reasons and providing information on the procedure for appeal.

(5) If candidates are unable to provide such evidence, the examinations board may accept other proof.

(6) The application will be rejected, if
1. conditions are not fulfilled in accordance with Section 1, or
2. documents are incomplete, or
3. the candidate has failed the Master's examination in a degree programme in accordance with Section 1 No. 2, or
4. the candidate has lost his/her entitlement to take examinations in a degree programme according to Section 1 No. 2 due to other reasons, or

5. the candidate is currently undergoing examination procedures in a different degree programme in accordance with Section 1 No. 2.

§ 15 Master's thesis

(1) The purpose of the Master's thesis is for candidates to prove that they are able to work independently, within a given period of time and using academic methods, on a problem from the field of Computer Science.

(2) The Master's thesis may be assigned and supervised by any authorised examiner in accordance with § 5, Section 2.

(3) The candidate must start working on the Master's thesis no later than in the semester after successful completion of the final examination component in accordance with § 13 Section 1 No. 1. If the deadline is not met, the Master's thesis will be graded as "failed" (5.0), unless the candidate is not at fault for exceeding the deadline.

(4) The topic of the Master's thesis will be determined by the thesis supervisor in agreement with the candidate. Where a corresponding application is filed, the examinations board chairperson shall ensure that said candidate receives a topic for their Master's thesis in due time. The candidate is permitted to propose topics; however, this does not constitute entitlement to a particular topic. The thesis topic will be assigned by the chairperson of the examinations board; the date of assignment must be recorded.

(5) The deadline for submission of the thesis is six months following assignment of the topic. In exceptional cases, the examinations board, in consultation with the supervisor, may extend this deadline by up to three months. If the deadline is not met, the Master's thesis will be graded as "failed" (5.0), unless the candidate is not at fault for exceeding the deadline.

(6) The topic, task and scope of the Master's thesis must be limited in such a way that the candidate is able to complete the thesis within the given time frame.

(7) The thesis should contain a German and an English summary.

(8) The Master's thesis may be written in German or English.

§ 16 Submission and assessment of the Master's thesis

(1) Three copies of the Master's thesis must be submitted to the examinations board in time; the submission date must be recorded.

(2) When submitting the Master's thesis, the candidate must assure in writing that he/she is the author of the work and has used no sources or aids other than those indicated, and that the principles and recommendations of scientific work

at Heidelberg University have been upheld.

(3) The Master's thesis will be assessed by two examiners, one of whom must be a professor. The first examiner should be the supervisor of the thesis. The second examiner will be appointed by the examinations board. The candidate is permitted to make a proposal; however this does not constitute entitlement examination by a particular examiner. The evaluation period should not exceed six weeks.

(4) The grade is calculated as the arithmetic mean of the two evaluations; § 11 shall apply accordingly. If the grades differ by more than one grade point, the examinations board will determine the Master's thesis grade after consulting both examiners. In such cases, a third examiner may be consulted.

(5) If the Master's thesis is graded as "failed" (5.0), it may be retaken with a new topic; retaking the thesis with the previous topic is not possible.

§ 17 Presentation of the Master's thesis

(1) A component of the Master's thesis is an oral presentation on the topics of the thesis. Candidates shall present and defend the findings of their Master's thesis in a discussion with the examiner. In this presentation, the candidate must prove that he/she has sufficient knowledge of the basic principles of the Master's thesis topic and associated fields. This oral presentation must be completed within two weeks following submission of the Master's thesis.

(2) In accordance with § 16 Section 3, the Master's thesis must be presented to both examiners. The presentation grade will be included in the assessment of the Master's thesis.

(3) The oral presentation of the Master's thesis lasts between 30 and 60 minutes.

(4) The presentation of the Master's thesis will be announced within the faculty. All members of the faculty of Computer Science as well as students in the respective degree programme may attend the presentation if sufficient space is available. Listeners can be prohibited from attending upon the candidate's request or for other valid reasons.

§ 18 Passing the examination

(1) The Master's examination is passed if all graded examination components received a "sufficient" grade (4.0) and all ungraded examination components are considered to be passed.

(2) § 11 applies for assessment of all examination components and the overall grade.

(3) In accordance with § 13 Section 1 No. 1, the overall grade of the Master's examination is calculated by including all examination component grades according to their credits and weighted at 65 % and the Master's thesis grade at 35 %.

(4) The overall grade is determined as follows:

for an average up to and including 1.5	very good
for an average of between 1.6 and up to/including 2.5	good
for an average of between 2.6 and up to/including 3.5	satisfactory
for an average of between 3.6 and up to/including 4.0	sufficient

If the overall grade is 1.0, the degree will be conferred with the notation: "with distinction".

§ 19 Master's diploma

(1) After the Master's examination is passed, a diploma will be issued, if possible within four weeks. It states all individual modules with their respective grades and credits, the topic and grade for the Master's thesis, and the overall grade. The diploma is dated with the day of the last examination component. It must be signed by the chairperson of the examinations board.

(2) A Diploma Supplement in German and English is included, which contains additional information about the course content and period of studies.

§ 20 Master's certificate

(1) A bilingual Master's certificate in German and English is issued with the diploma, bearing the same date as the diploma. It certifies the conferment of the academic degree "Master of Science".

(2) The Master's certificate is signed by the dean and the chairperson of the examinations board. It bears the faculty seal.

(3) If the candidate has failed the Master's examination, a certificate will be issued on request and on presentation of relevant proof, listing passed examination components and the corresponding grades as well as the missing examination components. It is signed by the chairperson of the examinations board and includes a note concerning the fact that the Master's examination has not been passed. The same applies for the Master's examination, if it is failed on the final attempt.

Section III: Final provisions

§ 21 Invalidity of examinations

(1) If a candidate has cheated on an examination and this is not discovered until after the diploma has been issued, the examinations board may correct the examination results that were affected by the deception and may declare the examination to be partially or completely failed.

(2) If the requirements for admission to the examination were not fulfilled, but without any intent on the candidate's part to deceive and this is not discovered until after the diploma has been issued, the passed examination will be considered a compensation for this shortcoming. If the candidate intentionally gained admission to the examination through deceit, the examinations board will make a decision on the matter.

(3) Before a decision is made, the candidate will be given the opportunity to provide an explanation.

(4) Fraudulent examination diplomas will be confiscated and, if necessary, a new diploma will be issued. If the examination has been graded as "failed" due to cheating or deception, the Master's certificate "Master of Arts" will be confiscated along with the fraudulent examination diploma. In accordance with Section 1 and Section 2 Sentence 2, a decision may not be made more than five years after the date indicated on the examination diploma.

§ 22 Access to examination documents

Within a year following completion of the examination procedure, the candidate may request access to written examination documents, examiners reviews and the examination minutes. The chairperson of the examinations board decides when and where access shall be given.

§ 23 Coming into force

These examination rules and regulations will come into force on the first day of the month following publication in the President's bulletin (Mitteilungsblatt des Rektors).

Attachment 1 Structure of the MA degree programme Applied Computer Science

1st Year:	
Academic work	2 CPs
Seminar	4 CPs
Application area	6 CPs
Compulsory elective	48 CPs
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	60 CPs
2nd Year:	
Seminar	4 CPs
Application area	12 CPs
Compulsory elective	14 CPs
Master's thesis	30 CPs
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	60 CPs
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	120 CPs

Explanations and Comments

1. The modules are interchangeable in terms of which semester they are selected as long as this does not disrupt the sequence of the courses.

2. Modules and areas of specialisation are described in the module handbook.

3. Credits can be obtained in max. 3 advanced internships.

4. The modules may, but do not have to be, associated with the areas specified in Section 5.

5. For compulsory elective components, 3 areas with at least 8 credits from the following areas each must be completed. To this end, specific specialisation areas as formulated in the module handbook may also be approved:

   - Theoretical computer science
   - Discrete and combinatorial optimisation
   - Software systems
   - Parallel and distributed systems
   - Database systems
   - Scientific computing
   - Computer engineering

- Image processing
- Computer graphics

Attachment 2: Subject modules

A. Compulsory modules:

Academic work	2 CPs
Two seminars, 4 CPs each	8 CPs

B. Compulsory elective modules:
The following list provides an overview of the selectable modules.
More detailed information can be found in the module handbook for the Master's degree programme in Applied Computer Science.

Academic work (IWA)
Advanced software internship (IFM)
Algorithmic optimisation I (MH16)
Algorithmic optimisation II (MH17)
Cluster computing 1 (ICC1)
Cluster computing 2 (ICC2)
Compiler construction (ICOM)
Computer algebra I (MG19)
Computer algebra II (MG20)
Databases 2 (IDB2)
Design of VLSI circuits using VHDL (MWInf3)
Distributed databases and information systems (IVDB)
Efficient algorithms 1 (IEA1)
Efficient algorithms 2 (IEA2)
Electronics (TIELE)
Electronics for physicists (UKEL1)
Embedded systems and real time (MWInf4)
Formal languages and automata theory (IFSA)
Hardware and software development for embedded systems (TIESY)
Image processing (MH19)
or image processing (MWInf6)
Knowledge discovery in databases (IKDD)
Linear optimisation (MD3)
Master's thesis (IMa)
Mathematical logic (MB9)
Microelectronics (UKEL2)
Mixed-integer programming and combinatorial optimisation (IMIP)
Modern architectures: Component-based and service-oriented systems (ISWArch)
Multidimensional signal analysis (TIMDS)
Non-linear optimisation (MD4)
Numerical linear algebra (MH5)
Numerical mathematics (MD1)

Numerical mathematics of ordinary differential equations (MH6)
Numerical mathematics of partial differential equations (MH7)
Numerical mathematics of transport processes in porous media (INTPM)
Numerical optimisation of differential equations (MH8)
Object recognition and automatic image comprehension (IOAB)
Object-oriented programming in scientific computing (IOPWR)
Parallel computer architecture (MWInf1)
Parallel solutions to large equation systems (IPLGG)
Parallel supercomputing (IPHR)
Pattern recognition (MH18)
or pattern recognition (MWInf7)
Physics of imaging (MWInf5)
Predictability and complexity I (MH14)
Predictability and complexity II (MH15)
Probability theory (MC4)
Probability theory II (MH13)
Quality management (ISWQM)
Requirements engineering (ISWRE)
Scientific computing (MD5)
Security in computer systems (ISIR)
Seminar (IS)
Signals and systems 2 (TISUS2)
Simulation tools (ISIMW)
Spatial databases (IRDB)
Statistics (MD2)
Statistics II (MH12)
VLSI design (TIVLSI)

Attachment 3: Application areas

All application areas in the Bachelor's degree programme Applied Computer Science are approved application areas:
Other application areas within the scope of available areas at Heidelberg University may, by request, be approved by the examinations board in agreement with the responsible faculty if the desired application area is reasonably associated with applied computer science.

The credits for the application area are obtained in the module "application area (IAG)". More information can be found in the module handbook.
Students must ensure that they do not select application area modules that were already completed in the Bachelor's degree programme.

Attachment 4: Grading in accordance with ECTS

In addition to the German grades, students who have passed the examination components will also be awarded an ECTS grade according to the following scale:

A	top 10 %
B	the following 25 %
C	the following 30 %
D	the following 25 %
E	the following 10 %

Data may be collected from one examination date, or one or several academic years. The basis of the data is disclosed with the ECTS grade.

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