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Heidelberg University and Heilbronn University Examination Rules and Regulations for the Master's Degree Programme in Medical Informatics

dated 12 October 2006

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Section I: General provisions

§ 1 Purpose of the academic programme and examination

- (1) The Master's programme in Medical Informatics focuses on the assessment and use of systems, methods, and tools to process information in the health care system, and on research and development in this field.
Students in the Master's programme learn how to make tactical and strategic decisions in the selection and use of systems and tools to process information within the health care system. The programme also involves the students in research and methodical developments in the fields of Medical Informatics and Bioinformatics. Once they have completed the relevant, operational training, students are able to take on leadership roles in these areas. The programme of study supplements, develops, and broadens the topics studied during a Bachelor's programme in a relevant subject. Graduates of the programme are able to use their initiative to analyse and solve information processing issues within the health care system, comfortably use academic methods relating to the field, and independently develop and improve them.
- (2) The purpose of the Master of Science examination is to assess whether students have an overview of the interconnections within their subject, have the ability to apply academic methods and knowledge, and are able to work independently according to sound, academic principles.
- (3) Admission to the academic programme is subject to separate admission regulations.

§ 2 Master's degree

Upon successful completion of the Master's examination, Heidelberg University will confer the academic degree, "Master of Science" (abbreviated to "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 time for the Master's examination and for completion of the Master's thesis.
- (2) Lectures and courses in the Master's degree programme are held in the first three semesters; the Master's thesis is to be completed during the fourth semester. Successful completion of the Master's degree programme requires a total of 120 credits (CP), obtained through both compulsory and elective courses.
- (3) The languages of instruction and examination are German and/or English.

§ 4 Modules, credits and transcript of grades

- (1) A module is a teaching unit, self-contained in terms of both time and content, and comprised of various lectures and courses. Modules consist not only of lectures and courses, but also of the examination prerequisites necessary for completion of the module.
- (2) The Master's programme is modular. The total of 120 credits is comprised of 86 credits from specialised lectures and courses, 4 credits from the final oral examination, and 30 credits from the Master's thesis.
- (3) The Master's thesis and the final oral examination are regarded as individual modules.
- (4) A distinction is made between:
 - compulsory modules: to be completed by all students.
 - compulsory elective modules: to be selected by the student from a limited subject area.
 - elective modules: to be freely chosen by the student from the modules offered within the subject.
- (5) All components within a module must be graded as "sufficient" (4.0) or better (sub-module grades) for the complete module to be passed.
- (6) Credits are given for successfully completed modules, including their individual components. One credit corresponds to a workload of 30 hours.
- (7) A transcript of records is issued at the end of each semester, listing all module and sub-module examinations students have passed, including the corresponding credits and grades.

§ 5 Examinations board

- (1) An examinations board consisting of six members will be established. It will be responsible for the organisation of examinations and the execution of the tasks defined in these examination rules and regulations. Five of its members must be professors. The sixth member will be a student with advisory authority. The professors are appointed for a three-year term, the student member for a one-year term. An examination office based at Heilbronn University will support the examinations board in the completion of its tasks. The Medical Faculty at Heidelberg University will appoint the chair of the examinations board and two of its members. The Faculty of Computer Science at Heilbronn University will appoint the deputy chair of the examinations board, and one further member. The deputy chair is the acting chairperson of the examinations board. If a member leaves the examinations board before their term is over, a new member is appointed for the remaining period.

- (2) The examinations board ensures that the examination rules and regulations are upheld, and provides recommendations for further improvement of the curriculum and the examination rules and regulations. It also appoints examiners and observers. The examinations board may confer responsibility for appointing examiners and observers on its acting chairperson. The board may be called upon for all questions regarding examinations.
- (3) The acting chairperson manages the business of the examinations board, and prepares its meetings. The chairperson chairs the meetings, and has the deciding vote in the event of a tie vote.
- (4) The examinations board may confer further tasks on its acting chairperson, provided this does not violate applicable law. Such a decision may be revoked at any time. The examinations board must be informed on a regular basis about the execution of these tasks.
- (5) Members of the examinations board have the right to attend examinations.
- (6) Members of the examinations board, examiners, and observers are obliged to maintain professional confidentiality. Members who are not civil servants are sworn to secrecy by the chairperson.
- (7) The candidate must be informed of negative decisions taken by the examinations board or the acting chairperson immediately and in writing; the reasons for the decision must be stipulated and information on the procedure for appeal must be provided.

§ 6 Examiners and observers

- (1) In general, examinations which are not completed during the course of study may only be carried out by professors, lecturers, associate professors, or research associates who have been granted the right to examine due to longstanding teaching experience. Research assistants, research associates, adjunct lecturers and lecturers with special responsibilities may only be appointed to conduct examinations in exceptional circumstances; when there are not enough faculty members available who are authorised to conduct examinations.
- (2) Examinations completed during the course of study are usually conducted by the teacher of the respective course.
- (3) Observers must have sat the corresponding Master's examination or equivalent.
- (4) The candidate may suggest an examiner for the Master's thesis and the final oral examination; however, this does not constitute legal entitlement to be examined by a particular examiner.
- (5) The acting chair of the examinations board ensures that candidates are notified of examiners' names in due time.

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

- (1) Course credits and examination results as well as academic degrees that were obtained through a degree programme at another state or state-recognised higher education institution or university of cooperative education (Berufsakademie) in the Federal Republic of Germany, or through degree programmes at state or state-recognised higher education institutions abroad, will be recognised as long as the skills acquired do not differ significantly from those required for the courses and examinations or the degrees that are replaced. 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. § 15, paragraphs 3 and 4, State Public Service Law (Landesbeamtengesetz, LBG) remain 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 credits to be recognised. The office conducting the recognition procedure is responsible for proving that an application does not fulfil the requirements.
- (4) If agreements existing between the Federal Republic of Germany and other states concerning the equivalence of university degree programmes (Equivalency Agreements) diverge from paragraph 1 and § 29, paragraph 2, clause 5 of the State Law of Baden-Württemberg on Higher Education (Landeshochschulgesetz, LHG), and thereby favour students from other states, the rules and regulations in the Equivalency Agreement shall take precedence.
- (5) Examination components are to be graded on the basis of a credit system that allows for recognition of credits from equivalent or similar degree programmes studied at Heidelberg University, or at other universities. This also applies to credits gained at universities of cooperative education, provided that equivalence is established.
- (6) Knowledge and skills acquired outside of the higher education system are to be recognised for a degree programme at a higher education institution if:
 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 are to replace, and
 3. the criteria for recognition have been verified through an accreditation procedure.Knowledge and skills gained outside of the higher education system may not replace more than 50% of the university degree programme. A placement test in

- line with paragraph 8 will determine the extent to which course credits and examination results are recognised.
- (7) Credits may be awarded for study and examination components completed in the context of refresher courses (Kontaktstudien). When recognising credits from refresher courses for a university degree programme, paragraphs 2 and 5, as well as paragraph 6, clause 1, item 1 apply accordingly. When recognising knowledge and skills gained outside of the higher education system for refresher courses, paragraph 6 applies accordingly.
- (8) If an application for recognition of periods of study, course credits and examinations as defined in paragraph 6 has not been assessed in line with paragraph 5, a placement test, usually in the form of an oral examination, will take place. § 6, § 8, § 10 and § 12 shall apply to this test accordingly.
- (9) Students are to submit their application for recognition of periods of study, course credits, and examinations to the examinations board. The board will subsequently decide whether to approve the application. If it is rejected, the board must inform the student of the reasons for this rejection in writing. In such cases, the student may raise an objection with the examinations board.

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

- (1) The student must register to sit examinations.
- (2) An examination is graded as "failed" (5.0) if the candidate fails to attend the examination and is unable to provide a valid reason for his or her absence, or if the candidate withdraws after the examination has started. The same applies if a written examination is not completed within the specified time frame, unless the candidate is not responsible for exceeding the time limit.
- (3) The candidate can withdraw from an examination up to three days before the examination takes place. If the candidate withdraws from an examination less than three days before it takes place, the reasons for this withdrawal must be plausible, and must be immediately submitted in writing to the examinations board. It is not possible to withdraw from an examination once it has started. If a child, for whom the candidate is generally the sole carer, is ill, a medical certificate must be provided. In the event of doubt, a medical certificate from a doctor designated by Heidelberg University or Heilbronn University may be requested.
- (4) When deciding whether the candidate is responsible for exceeding a deadline for registering for, or for taking an, examination, the examinations board must respect the provisions stated in the Maternity Protection Act (Mutterschutzgesetz) and the legal provisions concerning parental leave, and allow candidates to make appropriate use of these provisions.
- (5) If the candidate tries to influence the examination results through deception or by using unauthorised aids, the examination will be graded as "failed" (5.0). If a candidate disrupts the proper course of the examination, they may be excluded

from continuing the examination by the examiner or examination supervisor, in which case the examination will be graded as "failed" (5.0). In severe cases, the examinations board may exclude the candidate from all further examinations.

- (6) With regard to paragraph 4, clauses 1 and 2, the candidate may request that the decision be validated by the examinations board within a period of 7 days. 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.

§ 9 Types of examination component completed during the course of study

- (1) Examination components completed during the course of study are:
1. oral examinations
 2. written examinations (electronically, where applicable).
- (2) If candidates provide a medical certificate that plausibly proves that they are not able to take examinations in the form prescribed, whether completely or partially, due to permanent or chronic health problems, the examinations board may allow them to take an equivalent examination in an alternative form. The same applies for other course requirements.

§ 10 Oral examination components completed during the course of study

- (1) The purpose of oral examination components is to assess whether candidates are able to identify interconnections within the examination matter and relate specific problems to these interconnections. Furthermore, candidates should demonstrate that they have adequate fundamental knowledge relating to their academic programme.
- (2) An oral examination lasts between 15 and 45 minutes.

§ 11 Written examination components completed during the course of study

- (1) In written examination components, candidates should demonstrate that they are able to recognise problems relating to their subject and find solutions for them using subject-specific methods within a limited period of time and using limited resources.
- (2) A written examination lasts between 60 and 180 minutes. Multiple choice questions are permitted.
- (3) Multiple choice questions are generally set by the lecturer responsible for a course or lecture, as appointed by the examinations board. The examination questions must correspond to the knowledge imparted in the course or lecture, and must

provide reliable examination results. Before assessing the examination results, the person responsible, as determined in clause 1, must ensure that the examination questions adhere to paragraph 4, clause 2. If the examiner finds that individual examination questions are incorrect, these questions are to be disregarded in the determination of examination results. In such cases, the total number of questions is reduced accordingly, and assessment of the examination must be based on this reduced number. Reducing the number of examination questions must not have negative consequences for the candidate.

An examination carried out as a multiple choice examination is considered to be passed if at least 50% of the questions were answered correctly, or if the number of questions correctly answered by the candidate is not more than 22% below the average examination results of all candidates. (norm-referenced grading).

If a candidate has correctly answered the number of questions required to pass the examination, the multiple choice examination must be assessed as follows. In the case of norm-referenced grading, the scale for assessment is moved linearly by the difference between the absolute and relative thresholds for passing.

% corresponds to grade

≥ 50 – 55	4.0
> 55 – 60	3.7
> 60 – 65	3.3
> 65 – 70	3.0
> 70 – 75	2.7
> 75 – 80	2.3
> 80 – 85	2.0
> 85 – 90	1.7
> 90 – 95	1.3
> 95 – 100	1.0

- (4) If a written examination component is taken as a term paper, candidates must assure that they are the author of their own work and have used no sources or aids other than those indicated.
- (5) The assessment period for written examinations should not exceed four weeks.

§ 12 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	=	a performance which lies substantially above average requirements;

3 = satisfactory	=	a performance which fulfils 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 performance, 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 used.

(2) The final module grade is calculated on the basis of the unrounded values for sub-module examinations, weighted according to the number of credits they are worth. If a final examination is to be taken as part of a module, the grade for this final module examination constitutes the grade for this module. If an examination is a prerequisite for a subsequent examination, the credits gained for completing this prerequisite are counted in the total number of credits gained for the subsequent examination. If the student obtains more credits in an elective module than necessary, he or she can choose which examinations are used in the calculation of the final module grade.

(3) Final module grades and the overall grade for the Master's examination are as follows:

for an average up to/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

(4) When calculating final module grades and the overall grade for the Master's examination, only the first decimal after the point is taken into account, without rounding. The overall grade for the Master's examination is calculated in accordance with § 19, paragraph 2.

(5) In addition to the final grade calculated according to the German system, students who have passed the examination components will also be awarded a relative grade according to the following scale:

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

Depending on the size of the graduating cohort, the grades achieved by at least two previously graduating year groups may also be taken into account when calculating the relative grades for the current graduating year group. An ECTS grade must be stated along with the final degree grade, and, if possible and relevant, may be provided for individual modules.

Section II: Master's examination

§ 13 Master's examination admission requirements

Admission to the individual examinations for the Master's examination will only be authorised for those who:

1. are enrolled in the Master's degree programme in Medical Informatics at Heidelberg University and Heilbronn University,
2. have not lost their entitlement to take the final examinations in the Master's degree programme in Medical Informatics or in a Master's or Diplom programme in Computer Science.

§ 14 Admission procedure

- (1) The application for admission to the Master's examination must be made in writing, and be addressed to the acting chair of the examinations board. The following must be included in the application:
 1. evidence of fulfilment of the admission requirements outlined in § 13, point 1,
 2. a declaration from the candidate, stating whether they have previously failed a Master's or Diplom examination in a Medical Informatics or Computer Science degree programme, or whether they are currently involved in an examination procedure in such a degree programme.
- (2) If the candidate is unable to provide such evidence, the examinations board may accept other documents as proof.
- (3) The examinations board decides whether to admit the candidate on the basis of the application. Rejections must be substantiated and notified in writing along with instructions for appeal.
- (4) The application for admission to the examination may only be rejected if:
 1. the requirements outlined in § 13 are not fulfilled, or
 2. the documents set forth in paragraph 1 are incomplete, and have not been completed upon request, or
 3. the candidate has failed their final attempt at a Master's or Diplom examination in a Medical Informatics or Computer Science degree programme, or has lost their entitlement to take the final examinations, or
 4. the candidate is currently involved in examination procedures as described in point 3.

§ 15 Scope and nature of the examination

- (1) The Master's examination consists of:
 1. successful completion of the courses and lectures listed in Appendix 1,
 2. the final oral examination,
 3. the Master's thesis.
- (2) The examinations referred to in paragraph 1, item 1 are taken as an integrated part of the respective lectures or courses. They may be in written or oral form. The type and duration of each examination is stated in Appendix 1.
- (3) The Master's examination has to be completed in the following order: examination components completed during the course of study (paragraph 1, item 1), the final oral examination (paragraph 1, item 2), and the Master's thesis (paragraph 1, item 3).
- (4) In exceptional cases, and with due justification, the examinations board may allow examination components to be completed in an order different to that stated in paragraph 3. Once this permission is granted, the deadlines, by which the individual examinations must be completed, will be determined. If the examinations are not taken by the established deadlines, they will be graded as "failed" (5.0) unless the candidate is not responsible for exceeding the allocated time.

§ 16 Final oral examination

- (1) In the final oral examination, candidates should prove that they recognise interconnections within the subject matter examined and that they are able to relate specialist problems to these interconnections. In addition, the candidate should demonstrate broad fundamental knowledge as well as specialist knowledge in the specific subject area examined.
- (2) The final oral examination is conducted by two examiners, or by one examiner and one qualified observer. The candidate may suggest an examiner, however, this does not constitute legal entitlement to be examined by a particular examiner. The acting chair of the examinations board ensures that candidates are notified of examiners' names in due time.
- (3) In accordance with § 15, paragraph 1, item 1, candidates must take the final oral examination no later than four weeks after the completion of the last final examination component. If this deadline is not met, the final oral examination will be graded as "failed" (5.0), unless the candidate is not at fault for exceeding the deadline.
- (4) With the consent of the examiners, the candidate may suggest three topics to be covered during the final oral examination; the examination is not, however, limited to these topics.

- (5) The final oral examination lasts for approximately 30 minutes.
- (6) The candidate may choose whether the examination is held in German or English. This choice must be approved by the examiner and the examinations board.
- (7) Important content and the results of the oral examination are to be recorded in the minutes. Candidates must be notified of examination results immediately following the oral examination.
- (8) Students intending to take the same examination at a later date may be allowed to observe the examination, provided that there is enough space available. The student observers may not be present for the assessment or announcement of the examination results. Student observers can be prohibited from attending the examination if the candidate so requests, or for other valid reasons.

§ 17 Master's thesis

- (1) The Master's thesis serves to demonstrate that the candidate is able to work independently on a problem from the field of Medical Informatics, within a given period of time and using academic methods.
- (2) The Master's thesis may be assigned and supervised by any examiner authorised in accordance with § 6, paragraph 1, clause 1. Assignment and supervision by a qualified examiner from another department at Heidelberg University, Heilbronn University or another higher education institution requires the prior consent of the examinations board. With the prior consent of the examinations board, the Master's thesis may be completed at an institution outside of Heidelberg University and Heilbronn University; provided that it is supervised by an examiner authorised in accordance with clause 1.
- (3) The candidate must begin work on the Master's thesis no later than on the first day of the semester that follows the successful completion of the last examination taken during the course of study, or must have by that time submitted an application for the assignment of a topic to the acting chair of the examinations board. If the candidate fails to observe this deadline, the Master's thesis will be graded as "failed" (5.0), unless the candidate is not responsible for exceeding the time limit.
- (4) The topic of the Master's thesis will be determined by the thesis supervisor. If an application for assignment of a topic is submitted, the acting chair of the examinations board will ensure that the candidate receives a topic for the Master's thesis in due time. The candidate is permitted to propose topics; however, this does not constitute legal entitlement to a particular topic. The topic is assigned by the examination office. The date of assignment must be recorded.
- (5) The deadline for submission of the thesis is six months after the date on which the topic was assigned. In exceptional cases, the examinations board, in consultation with the supervisor, may extend this deadline by up to two months. If the deadline

is not met, the Master's thesis will be graded as "failed" (5.0) unless the candidate is responsible 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. The topic may only be rejected once, and only within the first month after the date of assignment.
- (7) The Master's thesis may be written in German or English. Upon approval from the supervisor and the examinations board, the thesis may also be written in other languages.

§ 18 Submission and assessment of the Master's thesis

- (1) Four copies of the Master's thesis must be submitted to the examination office before the established deadline; the submission date must be recorded. The thesis must contain a summary.
- (2) When submitting their Master's thesis, the candidate must assure in writing that they are the author of their own work and that they have used no sources or aids other than those indicated.
- (3) The Master's thesis is 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 propose a second examiner. This does not, however, constitute legal entitlement to examination by a particular examiner. The assessment period should not exceed six weeks.
- (4) The grade is calculated as the average of the two assessments; § 12 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.

§ 19 Passing the examination and overall grade

- (1) The Master's examination is passed if all examination components as set forth in § 15, paragraph 1 have been graded as "sufficient" (4.0) or better.
- (2) When calculating the overall grade for the Master's examination in accordance with § 12, paragraph 3, the numerical values of all module grades shall be considered without rounding according to § 12, paragraph 4, and weighted according to their respective number of credits.

§ 20 Retaking an examination component and deadlines

- (1) Failed examinations, or examinations deemed failed may be retaken once. This includes examinations failed at other universities. A second retake is only permitted for a maximum of five examination components completed during the course of study. A second retake is not permitted for the Master's thesis or the final oral examination.
- (2) Retaking an examination that has been graded as passed is not permitted.
- (3) Failed examinations must be retaken no later than during the following semester. If the candidate fails to meet this deadline, they will lose their entitlement to take the examination, unless they are not responsible for exceeding the deadline.
- (4) If the final attempt of an examination in a compulsory or elective module is failed, the candidate will be excluded from the academic programme. Failure of compulsory elective modules may be offset by the successful completion of a different compulsory elective module.

§ 21 Master's diploma and certificate

- (1) Once the Master's examination has been passed, a diploma will be issued within four weeks of all grades being published. This diploma will list all individual modules with their respective grades (graded in accordance with § 12 paragraph 3, and numerical value) and credits, as well as the grade and topic of the Master's thesis, and the overall grade of the Master's examination. The diploma bears the date on which the final examination component was completed, and must be signed by the chair and the acting chair of the examinations board.
- (2) A "Diploma Supplement" in German and English is also provided, containing additional information about the course content and the period of study. The content complies with the European Diploma Supplement Model.
- (3) A Master's certificate in English and German is issued with the diploma, which bears the same date as the diploma. It certifies the conferment of the academic degree, "Master of Science". The certificate is signed by the dean of the Medical Faculty at Heidelberg University and by the dean of the Faculty of Computer Science at Heilbronn University, and bears the seal of the University.
- (4) If the final attempt of the Master's examination is failed or is considered not to have been passed, the acting chair of the examinations board will issue a written notification, providing information on the procedure for appeal. Upon request and on presentation of supporting documents and the certificate of exmatriculation, a certificate will be issued that lists any completed examination components and their respective grades as well as the examination components still required to pass the Master's examination. It also indicates that the Master's examination has been failed.

Section III: Final provisions

§ 22 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 accordingly correct the examination results for the affected examination components 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 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) The candidate will be given the opportunity to provide an explanation before the decision is made.
- (4) The incorrect examination certificate will be confiscated, and, where applicable, a new certificate must be issued. If the examination has been graded as "failed" due to cheating or deceit, the Master's certificate will be confiscated along with the incorrect examination certificate. Decisions in accordance with paragraph 1 and paragraph 2, clause 2, may not be made more than five years after the date indicated on the examination certificate.

§ 23 Access to examination documents

Once the examination procedure has been concluded, the candidate has the right to request access to examination documents within a reasonable period of time. Requests must be made in writing, and must be submitted within one year of completion of the examination procedure. The chair of the examinations board will decide when and where such access will be granted.

§ 24 Coming into force

These examination rules and regulations come into force on 1 April 2007.

Appendix 1: Modules, lectures and courses in the Master's degree programme

Examination type:

CWE	=	course with an integrated written examination
COE	=	course with an integrated oral examination
CLW	=	course with integrated lab work
CPR	=	course with integrated presentation
IWE	=	interdisciplinary written examination
IOE	=	interdisciplinary oral examination
IPR	=	interdisciplinary presentation

Examination prerequisites

PR = presentation
 PR = project work

Students must take two of the four compulsory elective modules available (M8A-M8D, each worth 8 CP). Courses worth a total of six 6 credits must be taken for the elective module, Medical Informatics (M7). All modules are compulsory modules, unless otherwise indicated (compulsory elective modules or elective modules).

172100	M1	Complex Systems	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172101	M1.1	Complex Systems, Software Architecture, Compiler Development	1	4	CWE	120	6	
172102	M1.2	Practical Course: Complex Systems	1	3	PR		4	Successful completion of the practical course
172103	M2	IT Management 1	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172104	M2.1	Economics	1	3			4	
172105	M2.2	Social Aspects of Medical Informatics	1	1	CPR		1	Term Paper/Presentation
172106	M2.3	Human Resource Management and Laws	1	2	IWE	120	3	M2.1, M2.3
172107	M3	IT Management 2	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172108	M3.1	Business Process Modelling	2	4			6	
172109	M3.2	Project Management	2	2	IWE	120	3	M3.1, M3.2
172110	M4	Information and Quality Management	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172111	M4.1	Information Systems in Health Care	1	4	CWE	60	6	
172112	M4.2	Quality Management and Medical Controlling	2	3	CWE	60	4	
172113	M5	Formal Methods in Clinical Research	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172114	M5.1	Theoretical Foundations of Bioinformatics	1	2			3	
172115	M5.2	Trial Design in Biometry and Epidemiology	1	2	IWE	120	3	M5.1, M5.2
172116	M5.3	Knowledge-Based Diagnosis and Therapy Systems	2	3	CWE	90	4	
172117	M6	Data and Knowledge Integration	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172118	M6.1	Data Analysis and Data Mining	2	3			5	
172119	M6.2	Distributed Systems	2	3			4	
172120	M6.3	Knowledge Management	2	3	IWE	180	4	M6.1, M6.2, M6.3
172121	M7	Elective Module Medical Informatics 1	Sem.	WCH	Type	Min.	CP	
172122	M7.1	Current Topics from the Field of Biomedical Informatics	3	2	CWE	60	2	
172123	M7.2	Cryptography	3	2	CWE	60	2	
172124	M7.3	Pattern Recognition	3	2	CWE	60	2	
172125	M7.4	Operations Research	3	2	CWE	60	2	
172126	M7.5	Scientific Computing	3	2	CWE	60	2	
172127	M7.6	Simulation Processes	3	2	CWE	60	2	
172128	M7.7	Speech Recognition	3	2	CWE	60	2	
172129	M7.8	Graphical Data Processing	3	2	CWE	60	2	

172153	M7.9	Current Topics from the Field of eHealth	3	2	CWE	60	2	
172154	M7.10	Advanced Compiler Development Techniques	3	2	CWE	60	2	
172155	M7.11	Advanced C++ Techniques	3	2	CWE	60	2	
172156	M7.12	Health Economics	3	2	CWE	60	2	
172157	M7.13	Current Topics from the Field of Medical Informatics	3	2	CWE	60	2	
172130	M8A	Compulsory Elective Module Digital Media	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172131	M8A.1	Computer-Based Training/Web-Based Training	3	2			2	
172132	M8A.2	Multimedia Systems	3	2	IWE	120	3	M8A.1, M8A.2
172133	M8A.3	Practical Course: Computer-Based Training/Web-Based Training Systems	3	2	PR		3	Successful completion of the practical course
172134	M8B	Compulsory Elective Module Image and Signal Processing	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172135	M8B.1	Biosignal Processing	3	2			3	
172136	M8B.2	Medical Image Processing	3	2	COE	30	2	M8B.1, M8B.2
172137	M8B.3	Practical Course: Medical Signal and Image Processing	3	2	PR		3	Successful completion of the practical course
172138	M8C	Compulsory Elective Module Bioinformatics	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172139	M8C.1	Practical course: Bioinformatics and Biometry	3	2	PR		3	Successful completion of the practical course
172140	M8C.2	Methods of Bioinformatics	3	2			3	
172141	M8C.3	Systems Biology	3	2	COE	30	2	M8C.2, M8C.3
172142	M8D	Compulsory Elective Module Telemedicine	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172143	M8D.1	Communication Standards and Protocol in Telemedicine	3	2	CWE	60	2	
172144	M8D.2	Non-technical Aspects of Telemedicine	3	1			1	
172145	M8D.3	Practical Course: Telemedicine	3	1	PR		3	Successful completion of the practical course
172146	M8D.4	Application Fields and Interaction Scenarios	3	2	COE	30	2	M8D.2, M8D.4
172147	M9	Seminar	Sem.	WCH	Type	Min.	CP	Examination Comprises:
172148	M9.1	Seminar	3	2	CPR		4	Term Paper/ Presentation
172149	M10	Final Oral Examination	Sem.	WCH	Type	Min.	CP	
172150	M10.1	Final Oral Examination	3		COE	45	4	
172151	M11	Master's thesis	Sem.	WCH	Type	Min.	CP	
172152	M11.1	Master's thesis	4				30	

¹ Depending on the courses available, courses different to those named for elective module 7 may be taken. Courses that are not listed in this Appendix must be approved by the examinations board.

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