

**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 Masterstudiengang Biomedical Engineering” of 6 July 2017 has legal validity.**

**Heidelberg University Examination Rules and Regulations  
Master’s Degree Programme  
Biomedical Engineering**

as of 6 July 2017

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## Preamble

(Applies to German version:) For reasons of readability, the masculine form is used in these programme rules and regulations. It is understood, however, that all titles that appear in the masculine form, whether official, functional, or professional, refer equally to men and women. The feminine form of these titles may always be used by the women who hold them or when referring to positions in question.

## Section I: General Provisions

### § 1 Purpose of the academic programme and examinations

- (1) The Master's degree programme in Biomedical Engineering provides the students with professional knowledge and practical skills in the field of biomedical technology, which encompasses the diagnostic and therapeutic application of ionising and non-ionising radiation techniques.
- (2) Successful completion of the Master's degree programme in Biomedical Engineering leads to conferment of the academic title, "Master of Science" (M.Sc.), qualifying students to enter this profession. The Master's degree programme builds upon a Bachelor's degree in Physics (with a minor in Computer Science) or Computer Science (with a minor in Physics), or an Engineering Science programme that includes a substantial component in Physics, and expands upon the knowledge gained there in the specialised areas of medical physics and medical computer science. Applicants with other relevant degrees, e.g. medical technology, will also be considered for admission.
- (3) The purpose of the Master of Science examination is to determine whether students have achieved an overview of the interrelationships within their subject, have the ability to apply more in-depth scientific methods and findings, and to work independently, employing scientific principles.
- (4) 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, represented by the University of Mannheim Medical Faculty, will confer the academic degree of Master of Science (abbrev. 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 the Master's thesis.
- (2) Lectures and courses run for three semesters; the Master's thesis is to be completed within the fourth semester. The total workload required for successful completion of the Master's degree programme comprises a total of 120 ECTS credits (based on the European Credit Transfer

System).

- (3) The language of instruction and examinations is English.

#### **§ 4 Modules, credits, and transcript of records**

- (1) A module is a teaching unit, self-contained in terms of both time and content and comprised of various lectures and courses. It consists not only of the courses to be attended, but also includes the academic work required of students for the successful completion of the module.
- (2) The Master's thesis and the final oral examination constitute a separate module.
- (3) A distinction is made between:
- compulsory modules, which must be completed by all students
  - compulsory elective modules, which students may select from a limited range of modules
  - elective modules, which students may freely choose from the modules offered in their subject
- (4) In order to pass a module, students must earn a minimum grade of “sufficient” (4.0) or “passed” for all courses within that module (course grades).
- (5) Credits are awarded for successfully completed modules, including their individual components. One credit corresponds to a workload of approximately 30 hours.
- (6) A grade report (Transcript of Records) will be issued at the end of each semester, listing all module examinations students have passed, and the corresponding credits and grades.

#### **§ 5 Examinations board**

- (1) The examinations board is responsible for the organisation of examinations and the tasks required by the examination rules and regulations. It is made up of three professors or other university or adjunct instructors and a student representative, who serves in an advisory capacity. The members of the examinations board and their deputies are appointed by the faculty council. The examinations board student member is appointed by the faculty council based on a proposal from the departmental student committee. The chairperson must be a professor. The members are appointed for three years; the student member is appointed for one year. Members may be re-elected.
- (2) The examinations board ensures that the examination rules and regulations are upheld and provides recommendations for further improving the curriculum and the examination rules and regulations. The board also ensures that course assessments can be completed and subject examinations taken within the time frames stated in the examination rules and regulations. The board reports to the faculties on a regular basis regarding changes to examinations, study periods, including actual completion periods for Master's theses, as well as the distribution of subject grades and overall grades. This report is to be published in an appropriate form. The examinations board appoints examiners and observers. The examinations board may delegate these appointments to its chairperson. The board may be called upon for all questions regarding examinations. The chairperson manages the business of the examinations board,

prepares and chairs meetings and, in the event of a tie vote, has the deciding vote.

- (3) The examinations board may confer further tasks to its 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.
- (4) Members of the examinations board have the right to attend examinations.
- (5) Members of the examinations board, examiners and observers are obligated to maintain professional confidentiality. Members who are not civil servants are sworn to secrecy by the chairperson.
- (6) The candidate must be informed of negative decisions of the examinations board 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) As a rule, only professors of the Mannheim Medical School are authorised to conduct examinations that are not conducted during the course of study in conjunction with individual courses; Heidelberg University academic staff, honorary, guest and adjunct instructors are only authorised to conduct examinations that are not conducted during the course of study if they have been authorised by the Faculty Board to do so.
- (2) Observers must have taken the corresponding Master's examination or equivalent.
- (3) The candidate may suggest an examiner for the Master's thesis. This does not, however, constitute legal entitlement to be examined by a particular examiner.
- (4) The chair of the examinations board ensures that candidates are given sufficient advance notice of examiners' names.
- (5) Examinations held during the course of study are normally conducted by the instructor of the respective course.
- (6) § 5 paragraph 6 (professional confidentiality) applies to both examiners and observers.

## **§ 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 college 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. The validity of § 15, paragraphs 3 and 4 of the LBG (State Public Service Law) remains unaffected.

- (2) 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 burden of proof that an application does not meet the recognition requirements lies with the university body conducting the recognition procedure.
- (4) If existing agreements 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. at the time of recognition the applicant meets the applicable requirements for admission to a higher education institution,
  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.

The maximum number of credits that may be recognised for skills and competences acquired outside of the higher education system is 60 credits. A Master's thesis will not be recognised. If documentation of individual examinations that would provide evidence of specific knowledge and skills cannot be provided, the examinations board may request the completion of a placement test.

- (7) Credits may be awarded for coursework and examinations completed in the context of continuing education programmes for professionals (Kontaktstudien). When recognising credits from continuing education programmes for a university degree programme, paragraphs 2 and 5, as well as paragraph 6, clause 1, no. 1 apply accordingly. When recognising knowledge and skills gained outside of the higher education system for continuing education programmes for professionals, paragraph 6 applies accordingly.

## **§ 8 Withdrawal, unexcused absence, failure to meet deadlines, and deception**

- (1) An examination will be graded as "failed" (5.0), if a candidate fails to appear and is unable to provide a valid reason for his or her absence, or if the candidate withdraws after the examination has commenced. The same applies if the candidate fails to complete a written examination by the established deadline, unless the candidate is not at fault for the deadline

being exceeded.

- (2) Reasons for withdrawal or absence as set forth under paragraph 1 must be plausible and must be submitted to the examinations board immediately and in writing. If the candidate, or a child for whom the candidate is generally the sole caregiver, is ill, a medical certificate must be provided. In the event of doubt, a medical certificate from a designated physician may be required. If the reasons stated are accepted, a new examination date will be scheduled. In this circumstance, 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 registering and taking an examination, or for registering and submitting the Master's thesis, 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. The same applies for students with disabilities or chronic diseases, or for students with dependent relatives, in accordance with § 7 paragraph 3 of the Home Care Leave Act (Pflegezeitgesetz).
- (4) 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, the examiner or examination supervisor may exclude them from continuing the examination, in which case the examination will be graded as "failed" (5.0). In extreme cases, the examinations board may exclude the candidate from all further examinations.
- (5) The candidate has a period of seven days during which he or she may request that the examinations board review the decision in accordance with paragraph 4, clauses 1 and 2. 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 examinations

- (1) Types of examinations include:
  1. written examinations completed as part of modules taken during the course of study
  2. oral examinations completed as part of modules taken during the course of study
  3. Master's thesis, including presentation and defence.
- (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. The same applies to other course requirements.

## § 10 Oral or oral-practical examinations completed during the course of study

- (1) In oral or oral-practical examinations, candidates should be able to prove that they are able to identify interrelationships within the examination subject matter and relate specified problems to these interrelationships. Additionally, the purpose of the oral examination is to

assess whether candidates have a broad knowledge of the fundamental principles of their field of study.

- (2) Oral examinations are generally carried out by two examiners, or an examiner and a qualified observer.
- (3) An oral examination lasts between 30 and 60 minutes.
- (4) The topics examined and the results of the oral examination must be recorded in a written report. Candidates must be notified of examination results immediately following the oral examination.

### § 11 Written examinations completed during the course of study

- (1) In written examinations, candidates are required to demonstrate that they are able to recognise problems related to their subject and find solutions for them using subject-specific methods, within a limited time period and using limited resources.
- (2) A written examination, as defined in § 9, paragraph 1, number 1, lasts between 90 and 180 minutes.
- (3) The examination questions are generally determined by the course instructor who has been appointed by the examinations board. The examination questions must correspond to the knowledge imparted in the lecture or course and must provide reliable examination results. Before assessing the examination results, the person responsible, as determined in clause 1, must ensure that the questions for the examination are in accordance with clause 2. If this review indicates that individual examination questions are incorrect, these questions must be disregarded when assessing the examination results. In such a case, the total number of questions will be reduced and the assessment will be based on the reduced number of questions. A reduction in the number of examination questions may not have negative consequences for the candidates. If an examination consists of a series of questions, it will be considered to have been passed if at least 50% of the questions have been answered correctly, or when the number of questions correctly answered by the candidate is no less than 22% of the average number of questions answered correctly by all examination candidates (norm-referenced grading). In case of norm-referenced grading, at least 45% of the questions must be answered correctly.

If candidates correctly answer the number of questions required for passing the examination, the examination should be graded as shown below. 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.

Percentage correct and corresponding grade:

<50%	5.0		
≥50 – 55%	4.0	> 75 – 80%	2.3
> 55 – 60%	3.7	> 80 – 85%	2.0
> 60 – 65%	3.3	> 85 – 90%	1.7
> 65 – 70%	3.0	> 90 – 95%	1.3
> 70 – 75%	2.7	> 95 – 100%	1.0

- (4) If a written examination component is taken as a term paper, candidates must certify that they are the authors of their own work and have used no sources or aids other than those indicated.
- (5) The evaluation period for written examination components 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 the 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, due to considerable deficiencies, does not meet the requirements

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

- (2) The final module grade is calculated on the basis of the unrounded values of the individual module examinations, weighted according to the number of credits earned. If a final examination is to be taken as part of a module, the grade from this final module examination constitutes the grade for this module.
- (3) In accordance with § 19, paragraph 2, the grade for the module and the overall grade for the Master's examination will be calculated as the average of the grades achieved in the individual examination components. The overall grade is determined as follows:

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

If all components of the Master's examination are passed with a grade of 1.0, the degree will be conferred with the commendation: "with distinction".

- (4) When calculating final module grades and the overall examination grade, only the first decimal after the point is taken into account. The other decimals are dropped without rounding.
- (5) In addition to the German-system grades, students who have passed the examinations will also be awarded a letter grade according to the following scale:

A: the top 10 %  
B: the subsequent 25%



C: the subsequent 30%  
D: the subsequent 25%  
E: the subsequent 10%

The calculation of the relative grade will be determined by the number of students in the current year's group of the final year cohort, along with the numbers from the groups from at least the two previous years. The relative grade as indicated in the evaluation scale above is required to be provided for academic degrees; for individual modules – when possible and there is a corresponding need – it is optional.

## **Section II: Master's Examination**

### **§ 13 Master's examination admission requirements**

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

1. hold a general higher education entrance qualification, a relevant subject-related higher education entrance qualification, or an equivalent university entrance qualification legally recognised by the relevant authorities, and provide documentation of the completion of an academic degree comprising a minimum of 180 ECTS,
2. are enrolled at Heidelberg University in the Master's degree programme in Biomedical Engineering
3. have not lost their entitlement to take the final examinations in the Master's degree programme in Biomedical Engineering.
4. The application for admission to the Master's thesis must include documentation of successful participation in the modules set forth in Appendix 1.

### **§ 14 Admission procedure**

- (1) The application for admission to the Master's examination must be made in writing and addressed to the chair of the examinations board. The application must include the following documents:
  1. evidence of fulfilment of the admission requirements in accordance with § 13
  2. a declaration stating whether the candidate has already failed in a final attempt at the Master's examination in the Master's degree programme in Biomedical Engineering or are currently involved in an examination procedure.
- (2) If the candidate is unable to provide such evidence, the examinations board may accept other documents as proof. The application is the basis for the examinations board's decision as to whether the candidate may be admitted to the examination. Rejections must be made in writing, stating the reasons and providing information on the procedure for appeal.
- (3) 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 not complete, and have not been completed upon request, or
3. candidates have failed their final attempt at the Master's examination in Biomedical Engineering or have lost the entitlement to take the final examinations, or
4. the candidate is currently involved in an examination procedure in an identical degree programme.

### **§ 15 Scope and nature of the Master's examination**

(1) The Master's examination consists of:

1. successful completion of the modules set forth in Appendix 1,
2. the Master's thesis,
3. the oral presentation and defence of the Master's thesis.

(2) The components of the Master's examination must be taken in the following order:

- examinations completed during the course of study (in accordance with § 13, paragraph 4)
- Master's thesis.

(3) The examinations referred to in paragraph 1, number 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 the beginning of the lecture or course.

(4) In justified exceptional cases, the examinations board may allow the order in which components are completed (as stated in paragraph 2) to be altered. Once this permission is granted, the deadlines by which the individual examinations must be completed, will be determined. If these deadlines are not met, the examinations will be graded as "failed" (5.0), unless the candidate is not at fault for the deadline being exceeded.

### **§ 16 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, to address a problem from the field of Biomedical Engineering.

(2) The topic of the Master's thesis will be determined by the chairperson of the examinations board. The candidate is permitted to propose topics; however, this does not constitute entitlement to a particular topic. The date of the assignment must be recorded.

(3) In accordance with § 13, paragraph 4, the candidate must begin work on the Master's thesis no later than four weeks following successful completion of the last examination component, or, must have by that time submitted an application to the chairperson of the examinations board for the assignment of a topic. 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 deadline for submission of the thesis is four months after the date upon which the topic was assigned. In exceptional cases, the chair of the examinations board 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.
- (5) 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 following the date of assignment.
- (6) A manuscript prepared according to the specifications of a relevant peer-reviewed journal (in the category "Original Paper") may also be submitted as a Master's thesis. This must be accompanied by a supplemental text of between five to ten pages. Acceptance or rejection of submission of the manuscript will be determined by the examinations board.

### **§ 17 Submission and assessment of the Master's thesis**

- (1) Three hard copies and one digital copy (e.g. PDF file) of the Master's thesis are to be submitted to the examinations board by the deadline; the date of submission must be recorded. The thesis must include a brief summary, not to exceed two pages.
- (2) When submitting a Master's thesis, candidates must certify in writing that they are the authors of their work and have used no sources or aids other than those indicated.
- (3) The Master's thesis is assessed by two examiners who are appointed by the examinations board. One of the examiners must be a professor. One of the examiners must be the supervisor of the thesis. The candidate is permitted to make a proposal; however, this does not constitute entitlement to be examined 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 applies accordingly. If the grades differ by more than one grade point, the examinations board will determine the Master's thesis grade after consulting with both examiners. In such cases, a third examiner may be consulted.
- (5) 30 ECTS credits are awarded for the Master's thesis.

### **§ 18 Presentation and defence of Master's thesis**

- (1) The Master's thesis will be presented in a public oral presentation before the assigned examiners and be defended in a subsequent non-public academic discussion, which will last approximately 30 minutes (the Master's thesis thereby also includes the oral examination). Approximately fifty percent of the defence will focus on the topic of the Master's thesis, and the other fifty percent on the content of any modules taken during the course of study.
- (2) The presentation of the Master's thesis is to take place no later than eight weeks after the date of submission. The date of the presentation will be scheduled by the examinations board. The

candidate will be informed of the date no later than two weeks before the presentation.

- (3) The grade for the presentation and defence will be calculated as the mean of the individual grades given by the examiners; § 10 applies accordingly.
- (4) The topics examined must be recorded in a written report, which must be signed by the chairperson of the examinations board.

### **§ 19 Passing the Master's examination, overall grade**

- (1) The Master's examination is passed when all examinations have been graded as "sufficient" (4.0) or higher.
- (2) For the calculation of the overall grade in accordance with § 12 paragraph 2, 50% will consist of the grades from the examinations taken during the course of study (as set forth in §12, paragraph 3) and the remaining 50% will consist of the grade for the Master's thesis. For the portion of the overall grade that is based on the grades from the examinations taken during the course of study, the grades will be weighted according to the number of credits earned.
- (3) The overall grade of the Master's thesis is calculated from the grades earned for the written thesis and the oral presentation along with its defence. The grade for the written thesis is weighted by a factor of three; the grade for the oral presentation and defence is weighted by a factor of one.

### **§ 20 Retaking an examination; deadlines**

- (1) Examinations that are not passed may be retaken once. This includes failed examinations taken at other universities. A second re-examination is permitted only under exceptional circumstances and only for a maximum of two examinations; a second re-examination is not permitted for the Master's thesis. Approval must be granted by the examinations board.
- (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 candidates fail to meet this deadline, they will lose entitlement to take this examination, unless they are not at fault for the deadline being exceeded.

### **§ 21 Master's diploma and certificate**

- (1) Once the Master of Science examination in the Biomedical Engineering degree programme has been passed, a diploma will be issued. This will list all individual modules with their respective grades and ECTS credits, as well as the topic and grade for the Master's thesis and the overall grade, both as a number and a written designation. The diploma will be dated with the date of the last examination component. It must be signed by the chairperson of the examinations board and the dean of the Medical Faculty Mannheim.

- (2) A Diploma Supplement and a Transcript of Records, in English, will also be provided.
- (3) A Master's certificate bearing the same date as the diploma is issued with the diploma. It certifies conferment of the academic degree "Master of Science". The certificate will be signed by the chairperson of the examinations board and the dean of the Medical Faculty Mannheim and bears the seal of the Medical Faculty Mannheim.
- (4) If the Master's examination in the degree programme in Biomedical Engineering is failed on the final attempt or is considered not to have been passed, the chairperson 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) Before a decision is made, the candidate will be given the opportunity to provide an explanation. The incorrect examination certificate must be forfeited and, if applicable, a new certificate will be issued. If the examination has been assessed as "failed" on account of cheating or deception, the Master of Science certificate must also be forfeited. 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 submitted in writing, and within a period of up to three months after completion of the examination process. The chairperson of the examinations board will decide when and where such access will be given.

#### **§ 24 Coming into force**

These examination rules and regulations will come into force on the first day of the month following

their publication in the Rector's bulletin (Mitteilungsblatt des Rektors).

Heidelberg, 6 July 2017

Prof. Dr. Dr. h.c. Bernhard Eitel  
Rector

## Appendix 1: Modules with Certification of Participation International Master of Science in Biomedical Engineering

Joint Degree University of Heidelberg and Shanghai Jiao Tong University

The degree programme content covers all aspects of the innovative field of computational biophotonics, i.e. all aspects of the diagnostic and therapeutic use of photons in medicine, supported by advanced computing. Students will be resident in Mannheim/Heidelberg during the first year. In the second year, students have two options. The first option is to spend the 3rd and 4th semesters in Shanghai (elective modules or Master's thesis, respectively). The second option is to spend only the 3rd semester in Shanghai (elective modules) and then to complete the Master's thesis in Mannheim/Heidelberg. To receive a joint diploma from both institutions, students must spend at least half a year in a different country and institution.

### General Timetable:

1st Semester	2nd Semester	3rd Semester		4th Semester	
<u>Modules/Workshops</u> - M1 module - M2 module - M3 module - M4 module - M5 module (min. 30 ECT)	<u>Modules/Labs/Seminars:</u> - M2 module - M3 module - M4 module - M5 module - M6 module (min. 30 ECT)	<u>Modules/Labs/Seminars:</u> - M3 module - M4 module - M5 module - M7 module (min. 30 ECT)		M8 Master Thesis (30 ECT)	
<u>Specialisations:</u> - Radiotherapy - Imaging - Computational Medical Physics	<u>Specialisations:</u> - Radiotherapy - Imaging - Computational Medical Physics	<u>Specialisations:</u> - Radiotherapy - Imaging - Computational Medical Physics	<u>Specialisations:</u> - Neurosciences - Imaging/Biomedical Optics - Computer Engineering	<u>Specialisations:</u> - Radiotherapy - Imaging - Computational Medical Physics	<u>Specialisations:</u> - Neurosciences - Imaging/Biomedical Optics - Computer Engineering
<u>Venue:</u> Medical Faculty Mannheim, Heidelberg University, Germany	<u>Venue:</u> Medical Faculty Mannheim, Heidelberg University, Germany	<u>Venue:</u> Medical Faculty Mannheim, Heidelberg University, Germany	<u>Venue:</u> Shanghai Jiao Tong University, Shanghai, China	<u>Venue:</u> Medical Faculty Mannheim, Heidelberg University, Germany	<u>Venue:</u> Shanghai Jiao Tong University, Shanghai, China

**Modules Overview:**

1st Semester Winter Semester (Mannheim/ Heidelberg)	Module	Course Number	Course Name	ECTS	Type of course
	M1 Advanced Physics and Mathematics for Medical Applications	1.1	Biophysics	1.0	Mandatory
1.2		Engineering Mathematics + Exercises	3.0	Mandatory	
M2 Medicine and Radiobiology	2.1	Basic Molecular and Cellular Biology	1.0	Mandatory	
	2.2	Basic Medical Science	2.0	Mandatory	
M3 Radiotherapy	3.1	Radiation Physics and Instrumentation	2.0	Mandatory	
	3.2	Radiation Protection	1.0	Mandatory	
	3.3	Radiotherapy Treatment Planning/Quality Assurance	2.0	Mandatory	
	3.4	Treatment Planning and Quality Assurance Lab	1.0	Elective	
	3.5	Image Guided Radiotherapy	1.0	Elective	
M4 Medical Imaging	4.1	Physics of Imaging Systems	2.0	Mandatory	
	4.2	Biomedical Optics (1)	1.0	Mandatory	
	4.3	Biomedical Engineering + Exercise	2.0	Mandatory	
	4.4	Basic Optics and Laser	1.0	Elective	
	4.5	MR Radiology Lab	1.0	Elective	
	4.6	Seminar: MR Methods and Technology	2.0	Elective	
M5 Computational Medical Physics	5.1	Image Analysis + Exercises	4.0	Elective	
	5.2	Matlab Programming	4.0	Elective	



2nd Semester Summer Semester (Mannheim/ Heidelberg)	Module	Course Number	Course Name	ECTS	Type of course
	M2 Medicine and Radiobiology		2.3	Radiobiology	2.0
2.4			Basic Cellular Biology/Radiobiology Lab	1.0	Mandatory
2.5			Seminar: Radiobiology	1.0	Elective
M3 Radiotherapy		3.6	Special Radiotherapy Techniques	2.0	Elective
		3.7	Lab Medical Physics in Radiotherapy	5.0	Elective
		3.8	Seminar: Radiotherapy Techniques	2.0	Elective
M4 Medical Imaging		4.6	Seminar: MR Methods and Technology	2.0	Elective
		4.7	Nuclear Medicine + Exercise	4.0	Mandatory
		4.8	Lab Medical Physics in Imaging	5.0	Elective
		4.9	Seminar: Physics of Advanced MRI/CT Techniques	2.0	Elective
M5 Computational Medical Physics		5.3	Simulators in Games and Medicine + Exercises	8.0	Elective
		5.4	Volume Visualization + Exercises (advanced)	8.0	Elective
		5.5	Inverse Problems + Exercises (advanced)	8.0	Elective
		5.6	Computational Medical Physics Lab (advanced)	5.0	Elective
M6 Study Abroad		6.1	Shanghai Workshop	1.0	Elective

3rd Semester Winter Semester (Mannheim/ Heidelberg)	Module	Course Number	Course Name	ECTS	Type of course
	M3 Radiotherapy		3.4	Treatment Planning and Quality Assurance Lab	1.0
3.5			Image Guided Radiotherapy	1.0	Elective
M4 Medical Imaging		4.3	Biomedical Optics	1.0	Mandatory
		4.4	Biomedical Engineering + Exercise	2.0	Mandatory
		4.6	Seminar: MR Methods and Technology	2.0	Elective
		4.10	Advanced Imaging Techniques	2.0	Mandatory
		4.11	Medical Devices and Imaging Systems	4.0	Elective
		4.12	MRT Basics	2.0	Elective
		4.13	X-Ray Diagnostics and Sonography	2.0	Elective
M5 Computational Medical Physics		5.1	Image Analysis + Exercises	4.0	Elective
		5.2	Matlab	4.0	Elective
M7 Master Thesis Preparation		7.1	General Science Skills	3.0	Mandatory
		7.2	Specialized Lab Project	16.0	Mandatory

	Neurosciences	Imaging/Biomedical Optics	Computer Engineering
3rd Semester (Shanghai)	Elective modules (max. 30 ECTS)	Elective modules (max. 30 ECTS)	Elective modules (max. 30 ECTS)
	<ul style="list-style-type: none"> <li>• Nanotechnology (3.0)</li> <li>• BioMEMS (3.0)</li> <li>• Biomaterials (3.0)</li> <li>• Neurobiology (3.0)</li> <li>• Structure &amp; Function of Biomacromolecules (4.5)</li> <li>• Theoretical Neurosciences (4.5)</li> <li>• Experiments of modern lab animal science (1.5)</li> <li>• Bioheat &amp; Mass Transfer (4.5)</li> <li>• Neuroinformatics (3.0)</li> </ul>	<ul style="list-style-type: none"> <li>• Physical therapy technology (4.5)</li> <li>• Biomedical ultrasound (4.5)</li> <li>• Medical imaging (3.75)</li> <li>• New Technology in Medical Imaging (3.0)</li> <li>• Biomedical Sensors (4.5)</li> <li>• Laser medicine &amp; biophotonics (3.0)</li> <li>• Frontier problems of optics (4.5)</li> <li>• Non-linear optics of optical fibres (4.5)</li> <li>• Modern optics (4.5)</li> <li>• Optoelectronics (3.0)</li> <li>• Semiconductor devices (3.0)</li> <li>• Processing of optical information (3.0)</li> <li>• Principle &amp; technology of laser (4.5)</li> <li>• Non-linear optics (4.5)</li> <li>• Engineering optics (4.5)</li> </ul>	<ul style="list-style-type: none"> <li>• Application of Computers in Life Sciences (3.0)</li> <li>• Signal processing (4.5)</li> <li>• Digital signal processing (3.0)</li> <li>• Bioinformatics (3.0)</li> <li>• 3D image processing &amp; volume visualization (3.0)</li> <li>• Adaptive filtration (3.0)</li> <li>• Biomedical image processing (4.5)</li> <li>• TMS320 digital signal processor (3.75)</li> <li>• Random signal processing (4.5)</li> <li>• Opt. estimation theory &amp; system identification (4.5)</li> <li>• Computer graphics (4.5)</li> <li>• Wireless communication &amp; sensor networks (3.0)</li> <li>• Mobile &amp; wireless networking (4.5)</li> </ul>

4th Semester Summer Semester	Module	Course Number	Course Name	ECTS	Type of course
(Mannheim/ Heidelberg or Shanghai)	M8	8.0	Master's Thesis	30.0	Mandatory

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