

# **TEACHING AND EXAMINATION REGULATIONS**

**(see Article 7.13 of the Higher Education and  
Research Act)**

**MASTER'S DEGREE PROGRAMME**

**BIOMEDICAL ENGINEERING**

**DELFT UNIVERSITY OF TECHNOLOGY**

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## Section 1 - General

### Article 1 – Areas to which the regulations apply

3. These regulations apply to the teaching and the examinations related to the Master's degree programme in Biomedical Engineering, hereafter to be referred to as the programme.
4. The teaching and organisation of the programme is the responsibility of the Faculty of Mechanical, Maritime and Materials Engineering at Delft University of Technology, hereafter to be referred to as the faculty.
5. The programme is governed by Implementation Regulations which constitute part of these Teaching and Examination Regulations.

### Article 2 – Definitions of terms used

The terms used in these regulations should be interpreted as meaning the same as in the Higher Education and Scientific Research Act, insofar as they are defined in that Act.

The following terms are to be defined thus:

- a. the Act: the Higher Education and Scientific Research Act (in Dutch, the WHW), in the Dutch Bulletin of Acts, Orders and Decrees, number 593 and as amended since;
- b. the programme: the Master's degree programme as denoted in Article 7.3a paragraph 1, subparagraph b of the Act;
- c. student: anyone enrolled at Delft University of Technology as a student or extraneous student for the purpose of benefiting from education and/or for the purpose of sitting the examinations and undergoing the degree audit which form part of the programme;
- d. cohort: the group of students who have registered for a degree programme for the first time in a given academic year;
- e. teaching period: half a semester;
- f. subject: a teaching unit within the programme as intended in Article 7.3, paragraphs 2 and 3 of the Act;
- g. practical: a practical exercise as intended in Article 7.13, paragraph 2, subparagraph d of the Act, taking one of the following forms:
  - writing a thesis;
  - conducting a project or experimental design;
  - completing a design or research assignment;
  - conducting a literature review;
  - completing a work placement;
  - participating in fieldwork or an excursion;
  - conducting tests and experiments;
  - participating in other educational activities aimed at enabling participants to attain certain skills.
- h. examination: an assessment of the knowledge, insight and skills of a student in relation to a subject, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the board of examiners;

- i. component examination: an assessment of the knowledge, insight and skills of a student in relation to a component within a subject, as well as the marking of that assessment by at least one examiner, appointed for that purpose by the board of examiners;
- j. degree audit: an assessment by which the board of examiners, in accordance with Article 7.10 of the Act, establishes whether all examinations in the various subjects that constitute the programme have been successfully completed;
- k. board of examiners: the programme's board of examiners, which has been installed in accordance with Article 7.12 of the Act;
- l. examiner: the individual who, in line with Article 7.12, paragraph 3 of the Act, has been appointed to set the examinations;
- m. Implementation Regulations: the Implementation Regulations which form part of these Teaching and Examination Regulations;
- n. credit: a credit awarded in line with the European Credit Transfer System (ECTS); one credit denotes a study load of 28 hours;
- o. working day: Monday to Friday with the exception of recognised national public holidays;
- p. manual: a guide to the programme containing specific information pertaining to the various subjects;
- q. institute: Delft University of Technology;
- r. Blackboard: the electronic system designed for the exchanging of teaching information;
- s. disability: all conditions which are (at least for the period in question) chronic or lasting in nature and which form a structural limitation for the student in receiving education and/or sitting examinations or taking part in practicals.

### **Article 3 – The programme objective**

The goal of the master programme in Biomedical Engineering is to educate academic engineers, who are technically high-skilled and have additional medical and biological knowledge.

The graduates are capable to collaborate with physicians, researchers and other health care professionals in order:

- To identify, define and analyse biomedical problems, for the solution of which Biomedical Engineering principles and techniques can contribute
- To develop and to produce a sound solution to the problem
- To present these solutions effectively

### **Article 4 – The programme's final attainment levels**

The graduated Master of Biomedical Engineering meets, to a sufficient level, the following qualifications:

1. Broad and profound knowledge of the engineering sciences (mathematics and applied physics) and the capability to apply these at an advanced level in one biomedical engineering specialisation.
2. Broad and profound knowledge of science and technology of the particular BME-specialisation and, moreover, the skills to use this knowledge effectively in biophysical modelling of human

anatomy and physiology as well as in the design of technical tools to analyse, monitor, assist and replace anatomical and physiological functions in a clinically effective, biocompatible, safe and cost-effective way. The discipline is mastered at different levels of abstraction, including a reflective understanding of its structure and relations to other fields, and reaching in part the forefront of scientific or industrial research and development. The knowledge is the basis for innovative contributions to the discipline in the form of new designs or development of new knowledge.

3. Thorough knowledge of paradigms, methods and tools as well as the skills to actively apply this knowledge for analysing, modelling, simulating, designing and performing research with respect to innovative biomedical engineering, with an appreciation of different application areas.
4. Capability to independently solve technological and biophysical problems in a systematic way involving problem analysis, formulating sub-problems and providing innovative technical solutions, also in new and unfamiliar situations. This includes a professional attitude towards identifying and acquiring lacking expertise, monitoring and critically evaluating existing knowledge, planning and executing research, adapting to changing circumstances, and integrating new knowledge with an appreciation of its ambiguity, incompleteness and limitations.
5. Capability to work both independently and in multidisciplinary teams, interacting effectively with specialists and taking initiatives where necessary.
6. Capability to effectively communicate (including presenting and reporting) about one's work such as solutions to problems, conclusions, knowledge and considerations, to both professionals and non-specialised public in the English language.
7. Capability to evaluate and assess the technological, ethical and societal impact of one's work, and to take responsibility with regard to sustainability, economy and social welfare.
8. Attitude to independently maintain professional competence through life-long learning.

In addition, Master's graduates should possess the following kinds of competence:

1. *required core knowledge and understanding in their field of study;*
2. *knowledge of methods and technical practice in their field of study;*
3. *training in theoretical knowledge and methods, including modelling;*
4. *advanced knowledge of specific areas in their field of study;*
5. *specific attitude and way of thinking expected in a particular subject;*
6. *awareness of connections with other disciplines and ability to engage in interdisciplinary work.*

#### **Article 5 – Admission to the programme**

1. All students possessing a certificate proving that they have successfully completed their Bachelor of Science studies in Mechanical Engineering, Biomedical Engineering, Aerospace Engineering, Electrical Engineering, Applied Physics, Marine Technology, Industrial Design or Technical Mathematics will be admitted to the programme. In order to enter the MSc-programme, additional courses have to be followed.
2. Courses that were already a part of the bachelor programme of the student are not allowed in the master programme. The chosen minor may not affect the size of the master programme.
3. Students who do not possess the degree mentioned in paragraph 1 are required to obtain proof of admission to the programme from the dean, who will seek the advice of the board of examiners on this matter.
4. In order to obtain proof of admission, the student must meet or, as the case may be, possess:
  - a. the general relevant criteria set by the executive board are given in the appendix,

- b. a certificate, together with the accompanying list of marks, proving that he/she possesses knowledge of a sufficiently high level and broad scope to successfully complete the programme within the allotted period.
5. Students who have a B.Eng. degree of one of the Schools for professional education as listed in the study guide and who have successfully completed a pre-master programme as described in the study guide are admitted to the master programme.

#### **Article 6 – Taking the programme on a full-time or part-time basis**

This programme is taught only on a full-time basis

#### **Article 7 – Language**

1. Classes are taught and examinations and degree audits take place in English.
2. Notwithstanding the provisions of paragraph 1, the dean can give permission for classes to be taught in Dutch if the particular nature of the subject, the organisation, the quality of the education or the origin of the students gives cause for this.
3. Should a student request permission to complete one or more parts of the examination or the degree audit in a language other than English, this will be subject to the stipulations of the board of examiners in this regard, as laid down in the Rules and Guidelines of the board of examiners.

### **Section 2 - Composition of the study programme and the degree audit**

#### **Article 8 – Composition of the study programme and the degree audit**

1. The composition of the study programme and the relevant transitional regulations are laid down in the Implementation Regulations.
2. The Master's degree audit forms part of the programme. The programme has a total study load of 120 credits.

### **Section 3 - Examinations**

#### **Article 9 – Number, times and frequency of examinations**

1. There are two opportunities in each academic year for sitting examinations:
  - a. the first opportunity is immediately after the teaching period for the subject to which the exam in question relates,
  - b. the second opportunity is at the end of the teaching period following to the teaching period in previous line, or else during the resit period in August.
2. The frequency of examinations is laid down in the Implementation Regulations. A timetable of all the opportunities for sitting written examinations is drawn up on an annual basis and distributed before the start of the academic year.
3. If there is no indication as to the number of times a particular examination can be taken in any one academic year because it relates to a subject not taught by the programme itself, the relevant stipulations in the Teaching and Examination Regulations of the other programme will apply. The

board of examiners reserves the right to make decisions that deviate from the norm regarding this matter.

4. Notwithstanding the provisions of paragraph 1, there will be at least one chance in a year to sit examinations relating to subjects not taught in a given academic year.
5. In exceptional cases, the board of examiners may permit a deviation from the standard number of times that certain examinations can be taken.

#### **Article 10 – Sequence of examinations**

1. The sequence in which students are required to sit examinations and participate in practicals is laid down in the Implementation Regulations.
2. Exceptionally the dean may allow a student, who has not completed successfully a Bachelor of Science programme, to sit examinations and participate in practicals. Such permission may be restricted in time.

#### **Article 11 – Validity of examinations**

The result of an examination is valid for an unlimited period. However, in cases where the examination result dates from over six years ago, the board of examiners may impose an additional or substitute examination.

#### **Article 12 – The form of examination and method of assessment**

1. Examinations are set as described in the Implementation Regulations or the manual.
2. If there is no indication as to the way an examination is to be set because it relates to a subject not taught by the programme itself, the relevant stipulations in the Teaching and Examination Regulations or the manual of the other programme will apply.
3. The board of examiners may, if it so wishes, deviate from the provisions of paragraphs 1 and 2, in favour of the student.

#### **Article 13 – Oral examinations**

1. Only one student at a time will sit an oral examination, unless the examiner in question specifies otherwise.
2. A second examiner will be present during oral examinations, unless determined otherwise by the board of examiners.
3. Oral examinations will be held in public, unless determined otherwise by the board of examiners in a special case or unless the student has formally objected to the public nature of the examination.
4. Prior to an oral examination, the examiner must ask the student to provide proof of identity.

#### **Article 14 – Determining and announcing the results**

1. The examiner is required to determine the result of an oral examination as soon as it is finished and to supply the student with a written statement of the result.
2. In the case of written examinations, the examiner is required to determine the result as soon as possible after the examination but within 15 working days at most. The examiner forwards the

- necessary details to the student administration. Taking due account of the student's right to privacy, the student administration then ensures that the results are registered and published within 20 working days of the examination date. If the examiner is not able to meet these requirements due to exceptional circumstances, he or she must inform the board of examiners, stating the reasons for the delay. The student administration will then pass this information on to the students.
3. Regarding any examinations that are not taken orally or in writing, the board of examiners will determine beforehand precisely how and within what period of time the student will be notified of the results.
  4. When receiving the result of an examination, the student will be made aware of his or her right to inspect the results as referred to in Article 15, as well as the opportunity to lodge an appeal with the Examination Appeals Board.

#### **Article 15 – The right to inspect the results**

1. For a period of at least 20 working days after notification of the results of any written examination, the student has the right to inspect his or her marked work, on request. If a student intends to lodge an appeal regarding the marking of his or her work, he or she will be supplied with a copy of the marked work at cost price.
2. During the period referred to in paragraph 1, all interested individuals may acquaint themselves with the questions and assignments set in the examination, as well as with the criteria used for marking.
3. The board of examiners may determine that the right to inspection or perusal referred to in paragraphs 1 and 2 will take place at a location specified beforehand and at no less than two specific times, also decided on beforehand. If the student can prove that he/she is or was unable to be present at the location at the set time due to circumstances beyond his or her control, then another opportunity will be provided, if possible within the period stated in paragraph 1. The location and times mentioned in the first sentence will be announced well in advance.

#### **Article 16 – Discussing the examination results**

1. As soon as possible after the results of an oral examination have been announced, an opportunity can be arranged for the examiner to discuss the results with the student, either at the student's request or at the instigation of the examiner. At this meeting, the reasons behind the marks awarded will be explained.
2. For a period of 20 working days after the results have been announced, students who have taken a written examination may submit a request to discuss the results with the relevant examiner. The discussion will take place within a reasonable time span and at a place and time determined by the examiner.
3. In cases where a collective discussion is organised by or on the instructions of the board of examiners, a student may only submit a request, as described in the preceding paragraph, if he/she was present at the collective discussion and if he/she provides a good reason for the request or if, due to circumstances beyond his/her control, he/she was unable to attend the collective discussion.
4. The provisions of paragraph 3 are similarly applicable if either the board of examiners or the examiner first gives the student the opportunity to compare his/her answers with model answers.
5. The board of examiners may permit departures from the provisions of paragraphs 2 and 3.



## **Section 4 - Studying with a disability**

### **Article 17 – Adaptations to help students with a disability**

1. Students who have a physical or sensory disability are entitled to adaptations in teaching, examinations and practicals, on written request. These changes will be geared as much as possible to a student's individual needs, but they must not affect the quality or the degree of difficulty of a subject or an examination programme. The facilities provided to this end may involve adapting the form or duration of examinations and/or practicals to the student's individual situation or making practical aids available.
2. The request referred to in paragraph 1 should be accompanied by a recent medical certificate from a doctor or a psychologist. If there is evidence of dyslexia, the request should be accompanied by a document issued by a recognised dyslexia-testing bureau (i.e. registered with BIG, NIB, or NVO). If possible, this certificate should also estimate the extent to which the disability forms an obstacle to study progress.
3. Requests for the adaptation of teaching facilities will be decided upon by the dean or by the director of studies acting on the dean's behalf. The board of examiners will be decided on requests for adaptations to examinations.

## **Section 5 - Exemptions**

### **Article 18 – Exemption from examinations or practicals**

After having been advised by the relevant examiner, the board of examiners may decide to exempt students from an examination or practical on the grounds of:

- a. an examination, degree audit or practical completed within the Dutch higher education system or elsewhere which, as regards content and study load, corresponds with the subject for which exemption is sought, or
- b. knowledge and/or skills acquired outside the higher education system.

## **Section 6 - Degree audit**

### **Article 19 – The times and frequency of the degree audit**

At least three times a year there is an opportunity to undergo the Master's degree audit. The dates set by the board of examiners are published before the start of the academic year.

## **Section 7 - Study progress checks**

### **Article 20 – Study progress checks**

The student administration is responsible for ensuring that each student is able to see and check his/her own results via Blackboard.

## **Section 8 - Contravention, changes and implementation**

### **Article 21 – Contravening the regulations**

If the manual and/or any other regulations relating to the study programme and/or the examination programme prove to contravene these Teaching and Examination Regulations and the accompanying

Implementation Regulations, precedence will be given to the provisions of these Teaching and Examination Regulations in combination with the Implementation Regulations.

#### **Article 22 – Changes to the regulations**

1. Any changes made to these regulations will be made by special resolution of the dean.
2. No changes made will affect the current academic year unless it is reasonable to suppose that the interests of students will not be adversely affected.
3. None of the changes may, to the detriment of the student, influence any decisions concerning a student that are made by the board of examiners on the basis of these regulations.

#### **Article 23 – Transitional regulations**

1. If the composition of the study programme undergoes intrinsic changes or if these regulations are amended, the dean will draw up transitional regulations that will be incorporated into the Implementation Regulations.
2. Such transitional regulations are required to include:
  - a. provision concerning the exemptions that can be given on the basis of the examinations already passed;
  - b. provision specifying the period of validity of the transitional regulations.
3. If a subject is removed from the study programme, four opportunities to sit an examination in this subject will be granted after the last classes have been taught: an examination following on from the classes, a resit in the same academic year, and two resits in the subsequent academic year.
4. Notwithstanding the provisions of art. 5.1, a student who has been registered for the first time in a bachelor programme before 1 September 2006 and who has not yet completed the entire bachelor programme can be admitted to the master courses if he or she has completed the propedeutic exam and at least **100** ects of the second and third year of the bachelor programme.
5. Notwithstanding the provisions of art. 5.1, a student who has been registered for the first time in a bachelor programme Mechanical Engineering on or after 1 September 2006 and who has not yet completed his or her entire bachelor programme, can be admitted to the master courses until 31 August 2010 if he or she has completed the propedeutic exam and at least **100** ects of the second and third year of the bachelor programme.
6. Students belonging to the categories 23.4 and 23.5 are allowed to start the masters thesis only if they have passed their bachelor examination.

#### **Article 24 – Publication of the regulations**

1. The dean is responsible for finding a suitable way of publicising these regulations and the relevant Implementation Regulations, as well as any changes to the regulations.
2. The Teaching and Examination Regulations, together with the accompanying Implementation Regulations, will always be published on the programme's website.

#### **Article 25 – Entry into force**

This ruling will come into effect on 1 September 2008.

Appendix: Admission requirements Article 5.4.a

**Drawn up by the dean of the faculty on 1 September 2008.**