Teaching and Examination Regulations

2018-2019

Appendices master's degree programme Biomedical Engineering

Appendix I. Learning outcomes of the degree programme (art. 1.3)

A graduate with a Master of Science in BME is able to:

1. Acquire expertise in Biomedical Engineering
A Biomedical Engineer is able to continuously improve his/her expertise (knowledge and competences) by building on his/her thorough mastery of a specific field of biomedical engineering. This is demonstrated, not only by the Biomedical Engineer's ability to develop and apply new knowledge based on a critical reflection on standard knowledge, but more so by increasing or adapting his/her competences by critically and independently reflecting on his/her own thinking, decision making, and acting.

2. Analyse the problem and define aim
A Biomedical Engineer is able to analyse biomedical problems by (re)formulating ill-structured biomedical problems of a complex nature by choosing the appropriate level of abstraction and by critically examining existing theories, models or interpretations, based on the assessment of the scientific value of current research within Biomedical Engineering. The Biomedical Engineer thereby creates a cause-effect model, distinguishes the problems that are fundamental and solvable and defines the aim which has the highest priority.

3. Create an R&D proposal
A Biomedical Engineer is able to design different strategies to obtain the defined aim, and has the skills in, and the affinity with, the use, development and validation of models to allow the Biomedical Engineer to consciously choose the most efficient and effective Research and Design (R&D) plan.

4. Execute the R&D plan
A Biomedical Engineer is able to execute an R&D plan and to adapt it when external circumstances or advancing insight requires it. Depending on the project the focus may be more on the scientific approach to increase knowledge and understanding (research) or on the design of new techniques or systems (development) although both aspects are essential in the R&D cycle of innovative products.

5. Analyse and interpret the data
A Biomedical Engineer is able to ask adequate questions, and has a critical, yet constructive attitude towards analysing and solving complex real-life biomedical problems. The Biomedical Engineer is able to form a well-reasoned opinion in the case of incomplete or irrelevant data; is able to analyse and interpret the results of R&D in terms of statistics, limitations and the relation to existing literature aiming to contribute to the advancement of knowledge in his or her field of Biomedical Engineering and beyond it.

6. Communicate results

A Biomedical Engineer, as an interdisciplinary specialist, is able to communicate orally and in writing about R&D with colleagues, non-colleagues and other involved parties including health care providers and patients. In addition, the Biomedical Engineer is able to debate about both Biomedical Engineering and the place of Biomedical Engineering in society.

7. Embed the results in scientific and social context

A Biomedical Engineer is able to analyse and to discuss the social consequences (economic, social, cultural) of new developments in Biomedical Engineering with colleagues and non-colleagues; has insight into (debates about) scientific practice and is able to analyse and to discuss the ethical and the normative aspects of the consequences and assumptions of the scientific practice with colleagues and non-colleagues and is able to integrate these ethical and normative aspects in its own work.

8. Demonstrate a professional attitude

A Biomedical Engineer is able to incorporate the knowledge, skills and competences described above and demonstrates a professional attitude by showing a high level of independence, responsibility and commitment. In addition the Biomedical Engineer shows social skills as well as the ability to improve after feedback.

Appendix II. Specializations of the degree programme
(art. 2.2)

The degree programme is divided into the following specializations:

a. Diagnostic Imaging and Instrumentation
b. Biomaterials Science and Engineering
c. Medical Device Design

Appendix III. Content of the degree programme (art. 2.3)

Course details, mode of assessment and examination are described in Ocasys.

1. Course elements of the specialization Diagnostic Imaging and Instrumentation

Course elements year 1

Course element	ECTS
Radiation Physics	5
Introduction to MATLAB programming for BME	5
Conventional Imaging Techniques and Ultrasound	5
Medical Physics in Radiation Oncology	5
Computed Tomography	5
Image Processing	5
Statistical Methods in BME	5
Biomedical Instrumentation 2	5
Interdisciplinary Project	5
Internship [1]	15
Seminars (4) [1]	-

[1] As described in the Guidelines on the Student Portal

Course elements year 2

Course element	ECTS
Physics in Nuclear Medicine	5
MRI	5
Microscopy and Imaging	5
Applied Medical Visualization	5
Technology and the Ethics of Research	5
Master's Project [1, 2]	35
Seminars (4) [1]	-

[1] As described in the Guidelines on the Student portal

[2] Including Master project preparation, Winter symposium and Summer symposium

2. Course elements of the specialization Biomaterials Science and Engineering

Course elements year 1

Course element	ECTS
Interface Biology	5
Biomaterials 2	5
Introduction to MATLAB programming for BME	5
Biofilms	5
Engineering and Biotribology	5
Surface Characterisation	5
Statistical Methods in BME	5
Biomedical Instrumentation 2	5
Interdisciplinary Project	5
Internship [1]	15
Seminars (4) [1]	-

[1] As described in the Guidelines on the Student Portal

Course elements year 2

Course element	ECTS
Microscopy and Imaging	5
Recent Development in Biomaterials	5
Integrated Lab Course in Biomaterials	5
Colloid and Interface Science	5
Technology and the Ethics of Research	5
Master's Project [1, 2]	35
Seminars (4) [1]	-

[1] As described in the Guidelines on the Student portal

[2] Including Master project preparation, Winter symposium and Summer symposium

3. Course elements of the specialization Medical Device Design

Course elements year 1

Course element	ECTS
Biomaterials 2	5
Introduction to MATLAB programming for BME	5
Control Engineering	5
Prosthetics and Orthotics	5
Engineering and Biotribology	5
Mechatronics	5
Statistical Methods in BME	5
Biomedical Instrumentation 2	5
Interdisciplinary Project	5
Internship [1]	15
Seminars (4) [1]	-

[1] As described in the Guidelines on the Student Portal

Course elements year 2

Course element	ECTS
Interface Biology	5
Product Design by Finite Elements Method	5
Robotics	5
MEMS/NEMS and Nanofabrication	5
Technology and the Ethics of Research	5
Master's Project [1, 2]	35
Seminars (4) [1]	-

[1] As described in the Guidelines on the Student portal

[2] Including Master project preparation, Winter symposium and Summer symposium

4. CEMACUBE

Students of CEMACUBE registered at the University of Groningen will follow courses in year 1 or year 2 of the programme. The other year will be carried out a one of the partner universities.

In year 1 CEMACUBE students will follow an adjusted set of year 1 courses, taken from each specialisation:

Course elements year 1

Course element	**ECTS**
Biomaterials 2	5
Introduction to MATLAB programming for BME	5
Conventional Imaging Techniques and Ultrasound	5
Neuromechanics (elective)	5
Image Processing	5
Engineering and Biotribology	5
MEMS/NEMS and Nanofabrication	5
Statistical Methods in BME	5
Biomedical Instrumentation 2	5
Multidisciplinary Project	5
Internship [1]	15
Seminars (4) [1]	-

For year 2 the CEMACUBE student will follow the courses of one of the specialisations as mentioned in Appendix 2.

Appendix IV. Electives (article 2.4)

Courses selected by students

Upon request of the student, the Board of Examiners may approve a course that is not mentioned in Appendix III. The request procedure must be started at least 6 weeks before the start of the course, and starts when the Board of Examiners receives a new programme proposal, supplemented with argumentation for the request and a detailed course description. The argumentation should contain the relevance of the selected course for the student's individual curriculum.

The Board of Examiners will decide on an individual basis if permission is granted. The student will be informed about the Board's decision, within 6 weeks by email.

Appendix VI. Admission to the degree programme and different tracks (art. 5.1.1 + art. 5.2)

Admission to the Master's degree programme

1. Holders of a Bachelor's degree in Life Science and Technology with a major Biomedical Engineering from the University of Groningen, holders of a Bachelor's degree in Physics with the track Life and Health from the University of Groningen, and holders of a Dutch University Bachelor's degree in Biomedical Engineering are considered to have sufficient knowledge and skills and will be directly admitted to the Master's degree programme.

2. Holders of a non-university Bachelor's degree in electrical engineering or mechanical engineering may be admitted individually, under the condition of successfully finishing a premaster programme first. A premaster programme will have up to 60 ECTS.

Appendix VIII.

Application deadlines for admission
(art. 5.6.1)

Deadline of Application	EU/EEA students	non-EU/EEA students
Biomedical Engineering master	May 01, 2019	May 01, 2019

Decision deadlines
(art. 5.6.3)

Deadline of decision	EU/EEA students	non-EU/EEA students
Biomedical Engineering master	June 01, 2019	June 01, 2019