Appendices
to
Teaching and Examination Regulations
2026-2027
Bachelor's degree programme
in
Biomedical Engineering

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Appendix I. Learning outcomes of the Bachelor's degree programme (Art. 3.1.1)

A. Generic learning outcomes — Knowledge

A1. Bachelor's graduates have general knowledge and understanding of mathematics, natural sciences (biology, physics, chemistry), life sciences (biochemistry, anatomy, physiology) and engineering sciences (mechanical, electrical) underlying biomedical engineering.

A2. Bachelor's graduates are familiar with the quantitative nature of mathematics, natural sciences and engineering sciences, and have a general understanding of the models and methods used in these fields, including computer-aided methods.

A3. Bachelor's graduates are familiar with the learning methods necessary to follow developments in biomedical engineering. They are able to engage in lifelong learning and are prepared to continue in any Master's programme on Biomedical Engineering.

B. Generic Learning outcomes — Application of knowledge

B1. Bachelor's graduates are able to apply knowledge of mathematics, natural sciences, life sciences and engineering sciences to conduct research on basic biomedical problems; to contribute to design of new solutions to biomedical problems and to contribute to the further development of devices, instruments or materials.

B2. Bachelor's graduates are familiar with materials, equipment and technologies typically used in the biomedical practice. They know how to perform measurements on biological systems and are able to interpret the data, and are aware of the problems associated with the interaction between living and non-living materials and systems.

B3. When involved in design, research and/or development, Bachelor's graduates demonstrate the ability to critically formulate the relevant questions, choose or propose appropriate methods, procedures and/or systems.

C. Generic Learning outcomes — Decision making

C1. Bachelor's graduates are aware of the key aspects of professional, ethical and societal responsibilities linked to the biomedical engineering practice, to decision making and to formulating judgments.

C2. Bachelor's graduates are able to reflect on professional, ethical and social responsibilities of biomedical engineering.

D. Generic Learning outcomes — Communication

D1. Bachelor's graduates have a general understanding of functioning methods of multidisciplinary teams and are able to function effectively as team members, contributing to meet deliverable, schedule and budget requirements.

D2. Bachelor's graduates are familiar with the established methods/tools of communication and their limitations.

D3. Bachelor's graduates are able to identify the appropriate method to effectively, clearly and unambiguously communicate their findings/results in a multidisciplinary setting.

Appendix II. Majors and Minors (Art. 3.7.4 and 7.1.3)

The degree programme has the following Major(s):
The programme consists of a core part, laying down the foundations for all biomedical engineers, and specialisation courses in:

- Biomaterials Science and Engineering (BSE)
- Medical Imaging (MI)
- Medical Device Design (MDD)

The degree programme has the following Minor(s):

- Biomedical Engineering

The programme offers a 30 ECTS deepening Biomedical Engineering minor in semester 1 of year 3.
Any approved university minor or personal minor during this period is permitted, but not recommended.

Appendix III. Course units in the first year of the degree programme

- **List of course units (Art. 4.1.1 and 9.4.3)**
- **Compulsory order of examinations (Art. 9.3)**

Course elements year 1

The first year comprises a number of compulsory course units, listed in the table below. Course details, practical, entry requirements (order of examinations), and mode of assessment and examination, are described in Ocasys.

Compulsory course

Course code	Course unit name	ECTS
WBBE054-05	Calculus (for BME)	5
WBBE062-05	Principles of Design Engineering	5
WBLT002-05	Mammalian Cell Biology	5
WBBE024-05	Anatomy and Physiology	5
WBBE002-05	Biomechanics	5
WBBE005-05	Material Science	5
WBBE041-05	Molecules of Life for BME	5
WBBE028-03	Physics Lab for BME	3
WBBE030-02	Ethics 1: Philosophy of Science and Scientific Integrity	2
WBBE025-05	Statistics 1 for BME	5
WBBE007-05	Biomaterials 1	5
WBBE029-05	Linear Algebra for BME	5
WBBE026-04	Microbiology	4
WBBE061-01	Safe Microbiological Techniques BME	1

Approved replacement courses year 1

Compulsory course can be replaced by a similar course from another FSE bachelor programme.

BME course unit	Replaced by
WBBE054-05 Calculus (for BME)	WBAI048-05 Calculus for Artificial Intelligence WBIE003-05 Calculus 1 (for IEM)
WBBE029-05 Linear Algebra for BME	WBLT015-05 Linear Algebra (for LST) WBAI050-05 Linear Algebra and Multivariable Calculus WBPH054-05 Linear Algebra (for Physics)

Appendix IV. Course units in the second and third year of the degree programme

- **List of course units (Art. 7.1.1 and 9.4.3)**
- **Compulsory order of examinations (Art. 9.3)**

Course elements year 2

Year 2 consists of compulsory course units and elective courses. Course details, practical, entry requirements (order of examinations), and mode of assessment and examination, are described in Ocasys.

Compulsory courses

Course code	Course unit name	ECTS
WBBE055-05	Mathematical Tools for BME	5
WBBE033-05	Python and Numerical Methods	5
WBIE054-05	Dynamics and Vibrations	5
WBBE032-05	Electricity and Magnetism	5
WBBE063-04	Designing Biomedical Products	4
WBBE034-01	Ethics 2: Biomedical Ethics	1
WBBE059-05	Thermodynamics	5
WBBE057-05	Physics and Technology of Medical Imaging	5
WBIE030-05	Signals and Systems	5
WBBE040-05	Waves and Optics for BME	5
WBBE060-05	Biomedical Image Processing *	5
WBBE009-05	Electronics	5
WBBE035-05	Cell Biology and Immunology	5

* Registered master students of the Medical Imaging track are allowed to follow this course when needed to full fill the requirements for the post-master Medical Physicist.

Approved replacement courses year 2

Compulsory course can be replaced by a similar course from another FSE bachelor programme.

BME course unit	Replaced by
WBBE055-05 Mathematical Tools for BME	UCG2RM01 Calculus 2 WBMA029-05 Calculus 2
WBIE030-05 Signals and Systems	WBAI016-05 Signals and Systems (for AI)

Course elements year 3

Year 3 consists of compulsory course units, elective courses, a bachelor project (15 ECTS) and a minor (30 ECTS). To start the Bachelor's project Biomedical Engineering the student needs to have obtained a minimum of 145 ECTS of within the Biomedical Engineering bachelor degree programme, including all first-year courses, as well as the Research Course BME (WBBE010-09, WBBE010-08-8, or WBBE010-03). Course details, practical, entry requirements (order of examinations), and mode of assessment and examination, are described in Ocasys.

Compulsory courses

Course code	Course unit name	ECTS
WBBE065-05	Computational Methods	5
WBBE046-02	Ethics 3: Research Ethics	2
WBBE010-03	Research Course BME	3
WBBE901-15	Bachelor's Project Biomedical Engineering	15
	Minor	30
	Elective (1)	5

Minor

During the first semester (period 1A, 1B) students will have to follow a 30 ECTS minor. During the minor, a student can follow the deepening minor of the programme, an approved university minor, or a personal minor. For the deepening minor of the programme there is per period (1A, 1B) a choice of a specialisation course, combined with two minor elective courses.

Period 1A:

Course code	Course unit name	ECTS
	Specialisation course (1)	5
	Minor elective (2)	10

Choose one specialisation course from:

Specialisation	Course code	Course unit name	ECTS
BSE	WBBE036-05	Lab course Biomaterials	5
MDD	WBBE066-05	Smart Biomedical Prototyping	5
MI	WBBE058-05	Microscopy and Imaging *	5

* Registered master students of the Medical Imaging track are allowed to follow this course when needed to full fill the requirements for the post-master Medical Physicist.

Choose two minor elective courses from:

Course code	Course unit name	ECTS
WBBE052-05	Biofabrication	5
WBBE003-05	Biomedical Instrumentation	5
WBEC016-05	Teach like a Scientist	5

Period 1B:

Course code	Course unit name	ECTS
	Specialisation course (1)	5
	Minor elective (2)	10

Choose one specialisation course from:

Specialisation	Course code	Course unit name	ECTS
BSE	WBBE056-05	Polymeric Materials for Biomedical Application	5
MDD	WBBE048-05	Biomedical Sensors	5
MI	WBBE031-05	Imaging Laboratory 1 *	5

* Registered master students of the Medical Imaging track are allowed to follow this course when needed to full fill the requirements for the post-master Medical Physicist.

Choose two minor elective courses from:

Course code	Course unit name	ECTS
WBBE023-05	Transport in Biological Systems *	5
WBBE037-05	Surface characterization	5
WBBE035-05	Cell Biology and Immunology	5

* Registered master students of the Medical Imaging track are allowed to follow this course when needed to full fill the requirements for the post-master Medical Physicist.

Electives

During the first half of second semester (period 2A) students have to choose one elective course from:

Course code	Course unit name	ECTS
WBBE043-05	Imaging Laboratory 2 *	5
WBBE042-05	Tissue Engineering and Regenerative Medicine	5

* Registered master students of the Medical Imaging track are allowed to follow this course when needed to full fill the requirements for the post-master Medical Physicist.

Approved extracurricular course(s)
The below mentioned extracurricular course is approved.

Course code	Course name	ECTS
WMBE040-05	CybaNorth Team	5

Courses selected by students
Upon request of the student, the Board of Examiners may approve courses that are not mentioned in Appendix III or IV. The request procedure must start at least 6 weeks before the course enrolment deadline. The procedure starts when the Board of Examiners receives a request form with a detailed course description and a clear argumentation containing the relevance of the selected course for the student's 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 V. Contact hours (Art. 3.6.1)

The following candidates will be admitted to the second year:
Students who have been issued a positive study advice from the degree programme Biomedical Engineering at the University of Groningen.

The Board of Examiners decides over students from other degree programmes.

Degree programme year 1	
Structure contact hours	**Contact hours per year**
Lectures	110
Tutorials	60
Practicals	120
Supervision during an internship	N/A
Examinations	30

Degree programme year 2	
Structure contact hours	**Contact hours per year**
Lectures	180
Tutorials	120
Practicals	200
Supervision during an internship	N/A
Examinations	30

Contact hours during year 3 depend on courses chosen during the minor and/or elective(s).

Appendix VI. Additional Requirements Open Degree Programmes (Art. 7.3)

In exceptional circumstances students wishing to pursue an open degree programme may file a request with the Board of Examiners. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme and can determine further conditions in their Rules and Regulations.

Appendix VII. Transitional provisions (Art. 12.1)

Applies to all registered student who have to finalise one of the below mentioned courses

Course unit	**Replaced by**
Curriculum changes 2022-2023 and earlier:	
WBBY047-05 Molecules of Life	WBBE041-05 Molecules of Life for BME
WBIE003-05 Calculus 1 (for IEM)	WBBE054-05 Calculus (for BME)
WBBE047-05 Designing Biomedical Products 1	WBBE062-05 Principles of Design Engineering
WBPH021-05 Mechanics and Relativity 2	WBIE054-05 Dynamics and Vibrations
WBBE012-05 Imaging Techniques in Radiology 1	WBBE057-05 Physics and Technology of Medical Imaging
WBFA021-05 Thermodynamics	WBBE059-05 Thermodynamics
WBBE050-05 Biomedical Nanotechnology	WBBE056-05 Polymeric Materials for Biomedical Applications
WBPH021-05 Mechanics and Relativity 2	WBIE054-05 Dynamics and Vibrations

Changes curriculum 2023-2024:	
WBIE003-05 Calculus 1 (for IEM)	WBBE054-05 Calculus (for BME)
WBBE012-05 Imaging Techniques in Radiology 1	WBBE057-05 Physics and Technology of Medical Imaging
WBBE050-05 Biomedical Nanotechnology	WBBE056-05 Polymeric Materials for Biomedical Applications
WBBE051-05 Big data for BME	WBBE055-05 Mathematical Tools for BME
WBBE010-09 Research Course BME & WBBE046-01 Ethics 3: Research Ethics	WBBE010-08 Research Course BME & WBBE046-02 Ethics 3: Research Ethics
WBBE008-03 Designing Biomedical Products 2 & WBBE034-02 Ethics 2: Biomedical Ethics	WBBE008-04 Designing Biomedical Products 2 & WBBE034-01 Ethics 2: Biomedical Ethics

Changes curriculum 2024-2025:	
WBBE047-05 Designing Biomedical Products 1	WBBE062-05 Principles of Design Engineering
WBBE039-05 Capitum Selectum Medical Imaging Principles and Applications	WBBE060-05 Biomedical Image Processing
WBFA021-05 Thermodynamics	WBBE059-05 Thermodynamics
WBBE026-05 Microbiology	WBBE026-04 Microbiology & WBBE061-01 Safe Microbiological Techniques

Changes curriculum 2025-2026:	
WBBE008-04 Designing Biomedical Products 2	WBBE063-04 Designing Biomedical Products
For students who followed elective courses in year 2, period 2b during academic year 2024-2025 and earlier:	
WBBE060-05 Biomedical Image Processing	Can be replaced by one of the following courses: WBBE037-05 Surface characterization WBBE023-05 Transport in Biological Systems WBBE031-05 Imaging Laboratory 1 WBBE038-05 Biological Physics WBBE036-05 Lab course Biomaterials

WBBE037-05 Surface characterization WBBE023-05 Transport in Biological Systems WBBE031-05 Imaging Laboratory 1 WBBE038-05 Biological Physics WBBE036-05 Lab course Biomaterials	Can be replaced by: WBBE060-05 Biomedical Image Processing

Changes curriculum 2026-2027:	
WBBE038-05 Biological Physics	No longer part of the curriculum. Two exam opportunities will be offered in 2026-2027
WBBE044-05 Physicochemical Concepts in Bionanotechnology	No longer part of the curriculum. Two exam opportunities will be offered in 2026-2027
WBBE010-08 Research Course BME	WBBE010-03 Research course Biomedical Engineering and WBBE065-05 Computational Methods
WBBE004-05 Designing Biomedical Products 3	WMBE066-05 Smart Biomedical Prototyping
WBBE045-05 Applied Medical Visualization (minor course)	Will return in the minor curriculum of 2027-2028 Two exam opportunities will be offered in 2026-2027
Minor courses: WMBBE036-05 Lab Course Biomaterials WBBE066-05 Smart Biomedical Prototyping WBBE058-05 Microscopy and Imaging WBBE052-05 Biofabrication WBBE003-05 Biomedical Instrumentation WBEC016-05 Teach like a Scientist WBBE056-05 Polymeric Materials for Biomedical Applications WBBE048-05 Biomedical Sensors WBBE031-05 Imaging Laboratory 1 WBBE045-05 Applied Medical Visualization	Can be replaced by any minor course: MBBE036-05 Lab Course Biomaterials WBBE066-05 Smart Biomedical Prototyping WBBE058-05 Microscopy and Imaging WBBE052-05 Biofabrication WBBE003-05 Biomedical Instrumentation WBEC016-05 Teach like a Scientist WBBE056-05 Polymeric Materials for Biomedical Applications WBBE048-05 Biomedical Sensors WBBE031-05 Imaging Laboratory 1 WBBE045-05 Applied Medical Visualization