# Assessment plan for the curriculum of the Bachelor's degree programme in Biomedical Engineering

# Curriculum 2025/2026

Programme director: Prof. dr. ir. Erik van de Giessen

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Date approval Faculty Board:

## 1. Vision on assessment

1. Assessment should evaluate the students ability to apply knowledge, make judgments, and communicate in a professional way (both written and oral) with the aim to increase the quality of medical care and to decrease the cost and manpower, necessary for providing health care nowadays.
2. Assessment should enable qualification of a student to work in med-tech companies and (non-) academic hospitals
3. Assessment should enable qualification of a student to work in academic institutions to perform scientific research to new technologies that will contribute to more efficient health care and high quality of life
4. *Assessment as learning*: Assessment is part of the learning process to provide students feedback in their learning process.
    a. Assessment involves both feedback and summative assessment.
    b. Assessment is contextualized: this means that students receive feedback or are tested in practical context-rich assignments as much as possible.
    c. Learning and developing competencies is often team-based. Peers as well as teachers and/or professional from the field are needed as a mirror, to conduct a discussion, develop new insights and to ask critical questions.
    d. Problem solving and coping with problem solving tasks is seen as the core of the learning process.
5. Assessment should enable the evaluation of learning outcomes.

## 2. Assessment guidelines

1. Summative and formative assessment should be balanced in order to avoid "assessment steers learning" and to stimulate internal motivation.
2. Formative assessment is primarily intended to provide feedback about the learning process and progress.
3. Written and oral deliverables should receive extensive feedback from the available staff. In case staff is unable to deliver this feedback, the use of such deliverables should be reconsidered.
4. Group projects/assignments allow for self-reflection and for intergroup summative assessment. Both of these enrich the academic learning process.

## 3. Learning outcomes of the degree programme

### 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.

## 4. Overview of assessment methods, test moments for course units, and examiners

There is a distinction between BME course examiner (paragraph 1) and a Project examiner (paragraph 2) within the Biomedical Engineering Bachelor's programme.

*BME Course examiner*

Course examiners are appointed by the Board of Examiners as first or second course examiner. A BME course examiner can be part of the curriculum of the Master's and/or Bachelor's Biomedical Engineering programme (see table 4.1).

*Project examiner*

Project examiners are appointed by the Biomedical Engineering (BME) Board of Examiners as examiner of Bachelor projects. Project examiners are appointed by the Board of Examiners based on supervised projects of recent years (see table 5.1).

Project examiners will always operate next to a BME examiner and the BME examiner will have the final say on Assessment of the project

Table 4.1. Course overview with assessment method(s), test moments, formative function and examiners.

| Year and Period | | Course | ECTS | Assessment method(s) * | Does (part of the) assessment have a formative function? | Test moment(s) | First examiner | Second examiner |
|---|---|---|---|---|---|---|---|---|
| 1 | 1a | Calculus 1 (for BME) | 5 | WE, IT, AST | start, halfway, end | start, halfway, end | dr. W.P. (Wim) Krijnen | dr.ir. R. (Roel) Luppes |
| 1 | 1a | Principles of Design Engineering | 5 | AST, Peer | - | halfway, end | dr. ir. R (René) Fluit | dr. ir. C.C. (Charissa) Roossien |
| 1 | 1b | Anatomy and Physiology | 5 | AST, PR, WE/MC. IT | IT, PR | halfway, end | dr. T.G. (Theo) van Kooten | dr. T.M. (Tim) Valk |
| 1 | 1b | Biomechanics | 5 | WE, P, IT | IT | halfway, end | dr. A. (Andrea) Giuntoli | dr. P.K. (Prashant) Sharma |
| 1 | 1b | Material Science | 5 | WE, IT, AST | IT | halfway, end | dr. P.K. (Prashant) Sharma | dr. P. (Patrick) van Rijn |
| 1 | 2a | Molecules of Life for BME | 5 | WE, IT, AST | IT, AST | start, halfway, end | dr. M.M. (Michael) Lerch | dr. C. (Clemens) Mayer |
| 1 | 2a | Physics Lab for BME | 3 | WE, R | R | halfway, end | dr. M. (Mattia) Fontana | dr. J.S. (Jelle) Blijleven |
| 1 | 2a | Ethics 1: Philosophy of Science and Scientific Integrity | 2 | MC, AST, P | - | end | dr. G. (Gorazd) Andrejc | prof. dr. C. (Christoph) Jedan |
| 1 | 2a | Statistics 1 for BME | 5 | WE/MC, AST, P | AST | halfway, end | dr. B.W. (Brandon) Peterson | dr. J. (Jelmer) Sjollema |
| 1 | 2b | Biomaterials 1 | 5 | AST, MC | - | end | dr. P. (Patrick) van Rijn | dr. P.K. (Prashant) Sharma |
| 1 | 2b | Linear Algebra for BME | 5 | AST, WE | - | halfway, end | prof. dr. J. (Jaap) Top | dr. ir. H.J. (Henk) van Waarde |
| 1 | 2b | Microbiology | 5 | WE, PR, R | PR, R | start, halfway, end | dr. B.W. (Brandon) Peterson | dr. ir. G. (Girbe) Buist |
| 1 | 2b | Safe Microbiological Techniques | 5 | WE, PR | - | end | dr. B.W. (Brandon) Peterson | dr. ir. G. (Girbe) Buist |
| 2 | 1a | Mathematical Tools for BME | 5 | WE, IT, AST | - | halfway, end | prof. dr. C. (Cagri) Karakurt | dr. P.M.J. (Pieter) Tibboel |
| 2 | 1a | Python and Numerical Methods | 5 | PR | PR | start, halfway, end | dr. J. (Jelle) Aalbers | dr. J.W.A. (Jan-Willem) Brijan |
| 2 | 1b | Designing Biomedical Products | 4 | AST, R, P, Peer | AST, R, Peer | start, halfway, end | dr. ir. C.C. (Charissa) Roossien | dr. ir. R. (René) Fluit |
| 2 | 1b | Ethics 2: Biomedical Ethics | 1 | MC | - | end | dr. G. (Gorazd) Andrejc | prof. dr. C. (Christoph) Jedan |
| 2 | 1b | Electricity and Magnetism | 5 | AST, WE, P | AST | start, halfway, end | dr. M. (Myroslav) Kavatsyuk | prof. dr. N. (Nasser) Kalantar-Nayestanaki |
| 2 | 1b | Thermodynamics | 5 | WE, AST, PR, Peer | PR, Peer | halfway, end | dr. J. (Jelmer) Sjollema | prof. dr. M.M.G. (Marleen) Kamperman |
| 2 | 2a | Physics and Technology of Medical Imaging | 5 | WE, P | - | end | dr. M.J.W. (Marcel) Greuter | ir. A.L.J. (Arjen) van Hulzen |
| 2 | 2a | Waves and Optics for BME | 5 | WE, MC, PR, R | MC | start, halfway, end | dr. ing. S. (Somayeh) Asadi | prof. dr. W.H. (Wouter) Roos |
| 2 | 2b | Biological Physics | 5 | WE, R | - | end | prof. dr. P.C.A. (Patrick) van der Wel | prof. dr. W.H. (Wouter) Roos |
| 2 | 2b | Biomedical Image Processing | 5 | WE/MC, PR | - | end | dr. ir. P.M.A. (Peter) van Ooijen | dr. J.B.C. (Jan Bernard) Marsman |
| 2 | 2b | Surface characterization | 5 | WE, AST | - | halfway, end | prof. dr. R. (Romana) Schirhagl | dr. J. (Jelmer) Sjollema |
| 2 | 2b | Electronics | 5 | WE | - | end | prof. dr. G. (George) Palasantzas | prof. dr. ir. B.J. (Bart) Kooi |

* Assessment method: Written exam (WE), Multiple-choice exam (MC), Oral exam (OR), Report (R), Interim Test (IT), Assignment (AST), Practical exercise (PR), Presentation (P), Peer review (Peer).

Table 4.1. Continued.

| Year & Period | | Course | ECTS | Assessment method(s) * | Does (part of the) assessment have a formative function?* | Test moment(s) | First examiner | Second examiner |
|---|---|---|---|---|---|---|---|---|
| 3 | 1a | Applied Medical Visualization | 5 | MC, R | - | end | dr. ir. P.M.A. (Peter) van Ooijen | dr. L.V. (Sanne) van Dijk |
| 3 | 1a | Biofabrication | 5 | MC, P | - | end | dr. P.K. (Prashant) Sharma | dr. M. (Monize) Caiado Decarli |
| 3 | 1a | Biomedical Instrumentation | 5 | WE | - | end | dr. ir. G. (Gloria) Araiza Illan | prof. dr. R. (Romana) Schirhagl |
| 3 | 1a | Designing Biomedical Products 3 | 5 | AST, R, P, Peer | AST, Peer | start, halfway, end | dr. ir. C.C. (Charissa) Roossien | dr. Ir. R (René) Fluit |
| 3 | 1a | Microscopy and Imaging | 5 | WE, AST | - | halfway, end | dr F.P. (Felipe) Perona Martínez | dr. B.W. (Brandon) Peterson |
| 3 | 1a | Polymeric Materials for Biomedical Applications | 5 | WE, R, PR | R, PR | halfway, end | dr. M.K. (Gosia) Wlodarczyk-Biegun | dr. D. (Dina) Maniar |
| 3 | 1b | Research course Biomedical Engineering | 9 | PR, P, R | PR, P, R | halfway, end | dr. M.A. (Mohammed Ali) Shahbazi | prof. dr. H.A. (Hélder) Santos |
| 3 | 1b | Ethics 3: Research Ethics | 1 | MC | - | end | dr. G. (Gorazd) Andrejc | prof. dr. C. (Christoph) Jedan |
| 3 | 1b | Cell Biology and Immunology | 5 | WE, R | - | end | dr. T.G. (Theo) van Kooten | dr. J. (Jelmer) Sjollema |
| 3 | 2a | Biomedical Sensors | 5 | WE, P, PR | - | start, halfway, end | prof. dr. A.G.P. (Ajay) Kottapalli | dr. E. (Elisabeth) Wilhelm |
| 3 | 2a | Electronics | 5 | WE | - | end | prof. dr. G. (George) Palasantzas | prof. dr. ir. B.J. (Bart) Kooi |
| 3 | 2a | Imaging Laboratory 2 | 5 | OR, R | - | end | dr. M.J.W. (Marcel) Greuter | dr. A.T.M. (Antoon) Willemsen |
| 3 | 2a | Physicochemical Concepts in Bionanotechnology | 5 | WE/MC, AST | WE/MC, AST | halfway, end | dr. J. (Jelmer) Sjollema | dr. P.K. (Prashant) Sharma |
| 3 | 2a | Tissue Engineering and Regenerative Medicine | 5 | MC/WE, AST | - | end | dr. A.M. (Sandra) Smink | dr. T.G. (Theo) van Kooten |
| 3 | 2b | Bachelor's Project Biomedical Engineering | 15 | R, P, PR | PR, P | halfway, end | prof. dr. ir. E. (Erik) van der Giessen | *Examiners for the project are chosen with the subject* |
| **Courses organized by other programmes** | | | | | | | | |
| 1 | 1a | Mammalian Cell Biology | 5 | WE, AST | - | end | prof. Dr. G. (Geert) van den Bogaart | dr. R. (Rifka) Vlijm |
| 2 | 1a | Dynamics and Vibrations | 5 | WE | - | end | dr. L. (Liangliang) Cheng | prof. dr. ir. E. van der Giessen |
| 2 | 2a | Signals and Systems | 5 | IT, WE | - | halfway, end | dr. S. (Saeed) Ahmed | prof. dr. ir. B. (Bayu) Jayawardhana |
| **BME course not given in 2025-2026** (will return in curriculum of 2026-2027) | | | | | | | | |
| | 2b | Lab course Biomaterials | 5 | OR, PR, R | PR | halfway, end | dr. P. (Patrick) van Rijn | dr. P.K. (Prashant) Sharma |
| | 2b | Transport in Biological Systems | 5 | WE, AST | AST | halfway, end | dr. Ir. R (René) Fluit | dr. ir. P.D. (Pablo) Druetta |
| | 2b | Imaging Laboratory 1 | 5 | OR, PR, R | PR | halfway, end | dr. M.J.W. (Marcel) Greuter | dr. A.T.M. (Antoon) Willemsen |

* Assessment method: Written exam (WE), Multiple-choice exam (MC), Oral exam (OR), Report (R), Interim Test (IT), Assignment (AST), Practical exercise (PR), Presentation (P), Peer review (Peer).

# 5. Project examiners list

Below the project examiners are listed with their expertise. These examiners are no courses examiners (see paragraph 1), but are involved as a teacher in the bachelor's or master's programme, or are previous course coordinators of bachelor's or master's programme courses, are mentor in the master's programme, are an examiner/lecturer from another programme, or are experts in their files and have been supervising project in previous years. A Bachelor's research project will always have 2 examiners, of which one has to be a BME examiner. A BME examiner is always a course examiner involved in one of the Biomedical Engineering programmes. The BME examiner of a project has the responsibility to check the Biomedical Engineering content of the project application.

*Table 5.1.* Project examiner overview

| **BME project examiner** | **Department/Expertise** |
|---|---|
| dr. E.H.J.G. (Erik) Aarntzen | UMCG - Nuclear medicine, Imaging the immune system |
| dr. M.I. (Monica) Acuautla Menese | UG - Mechatronic engineering, Piezoelectric materials, MEMS/NEMS, Flexible Sensors |
| dr. ir. P. (Paul) Baron | UMCG - MRI Physics researcher |
| prof. dr. ir. D. (Deniz) Baskent | UMCG - Speech perception, speech technology, hearing loss, hearing aids, cochlear implants, development |
| prof. dr. R.M.F. (Rolf) Berger | UMCG - Pediatrics |
| prof. C.A. (Cristóbal) Bertoglio | UG - Mathematics, Interdisciplinary Applications/ BME/ Cardiac & Cardiovascular Systems |
| dr. F. (Frans ) Bianchi | UG - Biochemistry & Molecular Biology |
| prof. dr. H.J.G. (Henk) Bilo | UMCG - Internist |
| prof. dr. G.H. (Truuske) de Bock | UMCG - Oncological Epidemiology |
| dr. R.P.H. (Reinoud) Bokkers | UMCG - Intervention radiologist |
| dr. R.J.H. (Ronald) Borra | UMCG - Imaging/MRI |
| prof. dr. S. (Stefan) Both | UMCG - Radiology Oncology |
| dr. ir. C.L. (Charlotte) Brouwer | UMCG - Radiation Oncology, Medical Physics |
| prof. dr. R. (Raffaella) Carloni | UG - Robotics Lab |
| prof. dr. E.C.J. (Esther) Esther Consten | UMCG - Robotic and computer assisted surgery |
| dr. Bart Cornelissen | UMCG - Basic and translational Research and Imaging methodology Development |
| prof. dr. F.W. (Frans) Cornelissen | UMCG - Ophthalmology, Neurosciences, Neuroimaging |
| dr. B. (Branislava) Curcic-Blake | UMCG - Neuroimaging |
| dr. K. (Kevin) Damman | UMCG - Cardiology |
| dr. P.R. (Peter) van Dijk | UMCG - Endocrinologist |
| prof. dr. P.U. (Pieter) Dijkstra | UMCG - Rehabilitation |
| dr. J.M. (Menno)) Douwes | UMCG - Pediatric cardiology |
| dr. M. (Michiel) Eramus | UMCG - Cardiothoracic surgery, ex vivo lung and heart perfusion, mechanical heart support, lung surgery and mediastinal surgery |
| dr. F. (Federica) Fontanella | UMCG - AI in prenatal echography |
| dr. E.P.C. (Etienne) Gaudrain | UMCG - Auditory research: Auditory Scene Analysis in Cochlear-Implant users |
| dr. B.N.G. (Ben) Giepmans | UMCG - (Advanced) Microscopy, Molecular biochemistry, Cell Biology |
| dr. M.C.M. (Marijke) Gordijn | UG - Human Chronobiology, Chronibiology and sleep |
| dr. C. (Christian) Greve | UMCG - Movement science/Beatrixoord |
| dr. J.M. (Juha) Hijmans | UMCG - Rehabilitation |
| dr. R.F. (Roland) Hoffmann | UMCG - cholesteatoma care, cochlear implantation, bone conduction implantation, stapes surgery, tinnitus |
| dr. M. (Mike) Hogervorst | UMCG - Trauma surgery and spinal surgery |
| dr. W.M.H. (Willem) Hoogaars | UMCG - (Advanced) Microscopy, Molecular biochemistry, Cell Biology |
| dr. A. (Anouk) van der Hoorn | UMCG - Radiology, Nuclear Medicine & Medical Imaging |
| prof. J.H.P. (Han) Houdijk | UMCG - Clinical Movement Sciences |
| dr. C.V. (Christian) Hulzebos | UMCG - Pediatrics, neonatology |
| prof. dr. P.C. (Paul) Jutte | UMCG - Orthopedics |
| prof. dr. M.A.J. (Marina) de Koning-Tijssen | UMCG - Neurologists Movement Disorders http://movementdisordersgroningen.com/en |
| dr. ir. E.W. (Erik) Korevaar | UMCG - Medical Physicist Radiation oncology |
| dr. J. (Joep) Kraeima | UMCG – 3D lab |
| dr. A.O. (Anastasiia) Krushynska | UG - Mechanics, Mechanical Engineering, Acoustics |
| dr. R. (Roald) Lambrechts | UMCG - Molecular and Cellular Biology |
| prof. dr. C.J.C. (Claudine) Lamoth | UMCG - Movement Analysis and Smart Technology in Aging |
| prof. dr. H.G.D. (Henri) Leuvenink | UMCG - Groningen Institute for Organ Transplantation |
| dr. P. (Peter) van Luijk | UMCG - Damage and Repair in Cancer Development and Cancer Treatment (DARE) |

Table 5.1. Continued.

| **BME project examiner** | **Department/Expertise** |
|---|---|
| dr. A.M.L. (Anne) Meesters | UMCG - 3D Lab/Imaging/Trauma Surgery |
| prof. dr. H.C. (Henny) van der Mei | UMCG - BME |
| dr. V.E. (Vincent) de Meijer | UMCG - HPB and Liver Transplant Surgeon |
| dr. S.K. (Sanne) Meles | UMCG - Neuroimaging |
| prof. dr. S. (Sarthak) Misra | UMCG - BME/UT Twente - Surgical Robotics Lab |
| dr. C. (Cyril) Moers | UMCG -Tansplantation, Organ preservation |
| dr. T. (Taraneh) Mokabber | UG - Biomaterials Materials Science |
| dr. A. (Alessio) Murgia | UMCG - Rehabilitation, Neurosciences, BME |
| prof. dr. W.N. (Maarten) Nijsten | UMCG - Critical Care |
| prof. dr. P. (Peter) Olinga | UG - Translational Biopharmaceutics |
| dr. A.R. (Rob) den Otter | UMCG - Neurosciences, Rehabilitation |
| dr. P. (Peter) Pijpker | UMCG - 3D lab - development and application of 3D technology |
| dr. P. (Pietro) Pisciotta | UMCG - Medical Physicist |
| dr. S.J. (Sonja) van Tuinen-Pyott | UMCG - Peripheral auditory system, Hearing loss and tinnitus, Neuroscience |
| dr. L. (Laurens) Reinke | UMCG - Simulation Center UMCG |
| prof. dr. M.F. (Michiel) Reneman | UMCG - Pain Rehabilitation and Work Participation |
| prof. H.A. (Hélder) Santos | UMCG - Biomedical Engineering |
| dr. R.C.L. (Richte) Schuurmann | UMCG - Surgery |
| dr. A. (Alina) Sigaeva | UMCG - Free radicals regulation and cell communication |
| dr. J. (Joyce) van Sluis | UMCG - Imaging (PET) |
| prof. dr. C.K. (Corry) van der Sluis | UMCG - Rehabilitation Medicine |
| dr. D.(Dominika) Suchá | UMC Utrecht - Radiology: Cardiothoracic imaging |
| dr. I. (Ignace) Tielliu | UMCG - Endovascular repair of peripheral artery aneurysms, Diagnosis and treatment of vascular graft and endograft infections |
| dr. H. (Hans) Timmerman | UMCG - Anesthesiology |
| dr. H.C. (Hugo) van der Veen | UMCG - Orthopedic surgery |
| dr. R.J.K. (Riemer) Vegter | UMCG - Human Movement Science |
| prof. dr. R. (Rozemarijn) Vliegenthart | UMCG - Radiology, Nuclear Medicine & Medical Imaging |
| dr. M. (Marina) Volkova | UMCG - Molecular Biology |
| prof. dr. J.P.P.M. (Jean-Paul) de Vries | UMCG - (Vascular) surgery |
| dr. M.K. (Marieke) van Vugt | UG - Artificial Intelligence, mind-wandering, decision making, EEG, cognitive modeling; mindfulness, attention, social neuroscience, brain decoding, computational psychiatry, depression |
| dr. C.W.J. (Kars) van der Weijden | UMCG - Neuroimaging, Radiology, Nuclear Medicine & Medical Imaging Neurosciences |
| dr. R. (Robin) Wijsman | UMCG - Radiotherapist Oncology |
| dr. A.R. (Arthur) Wijsmuller | UMCG - Consultant surgeon |
| dr. T.P. (Tineke) Willems | UMCG - Cardiovascular Centre |
| dr. P.J. (Pieter) van der Zaag | UG - Microscopy, Nanoscience & Nanotechnology, Radiology, Nuclear Medicine & Medical Imaging |
| prof. dr. J.A.M. (Clark) Zeebregts | UMCG - Applied endovascular techniques, Carotid surgery, Vascular anastomotic techniques, Vascular prosthetic graft infections, Translational research after atherosclerotic plaque morphology, new molecular imaging techniques |

## 6. Relationship between course units and details of the learning outcomes

*Table 6.1.* Relationship between course units and learning outcomes of the programme, given per year, divided into periods. An X in the table indicate that the learning outcome is explicitly assessed in the course. Courses indicated in Italic are compulsory elective courses (E) or deepening minor courses (M).

| **Year 1** | | **Learning outcomes** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A. Knowledge** | | | **B. Application of knowledge** | | | **C. Decision making** | | **D. Communication** | | |
| **Period** | **Course** | A1: math, biology, physics, (bio)chem, anatomy, physiology, engineering | A2: models and methods used in these fields, including computer-aided methods | A3: learning methods necessary to follow developments. Prepare for lifelong learning and Masters. | B1: apply knowledge for design of new solutions to biomedical problems | B2: perform measurements on biological systems and are able to interpret the data | B3: critically formulate the relevant questions, choose or propose appropriate methods, procedures and/or systems. | C1: key aspects of professional, ethical and societal responsibilities | C2: reflect on professional, ethical and social responsibilities | D1: understanding of functioning methods of multidisciplinary teams | D2: familiar with the established methods/tools of communication and their limitations | D3: effectively, clearly and unambiguously communicate their findings/results in a multidisciplinary setting |
| 1a | Calculus 1 (for BME) | x | | | | | | | | | | |
| | Principles of Design Engineering | | x | | x | | | | | x | | |
| | Mammalian Cell Biology | x | | | | | | | | | | |
| 1b | Anatomy and Physiology | x | | | x | | | | | | | |
| | Biomechanics | x | x | | | | | | | x | | |
| | Material Science | x | | | | | | | | | | |
| 2a | Molecules of Life for BME | x | | | | | | | | | | |
| | Physics Lab for BME | x | x | | | x | x | | | | | |
| | Statistics 1 for BME | x | x | | | | x | | | | | |
| | Ethics 1: Philosophy of Science and Scientific Integrity | | | | | | | x | x | | | |
| 2b | Biomaterials 1 | x | | x | x | | | | | | | |
| | Linear Algebra for BME | x | | | | | | | | | | |
| | Microbiology | x | | x | | | | | | | | x |
| | Safe Microbiological Techniques | | | | | x | | x | | | | |

Table 6.1. Continued

| **Year 2** | | **Learning outcomes** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A. Knowledge** | | | **B. Application of knowledge** | | | **C. Decision making** | | **D. Communication** | | |
| **Period** | **Course** | A1: math, biology, physics, (bio)chem, anatomy, physiology, engineering | A2: models and methods used in these fields, including computer-aided methods | A3: learning methods necessary to follow developments. Prepare for lifelong learning and Masters. | B1: apply knowledge for design of new solutions to biomedical problems | B2: perform measurements on biological systems and are able to interpret the data | B3: critically formulate the relevant questions, choose or propose appropriate methods, procedures and/or systems. | C1: key aspects of professional, ethical and societal responsibilities | C2: reflect on professional, ethical and social responsibilities | D1: understanding of functioning methods of multidisciplinary teams | D2: familiar with the established methods/tools of communication and their limitations | D3: effectively, clearly and unambiguously communicate their findings/results in a multidisciplinary setting |
| 1a | Mathematical Tools for BME | x | | x | | | | | | | | |
| | Python and Numerical Methods | | x | | | x | | | | | | |
| | Dynamics and Vibrations | x | x | | | | | | | | | |
| 1b | Designing Biomedical Products | | x | | x | | | | | x | | |
| | Electricity and Magnetism | x | | | | | | | | | | x |
| | Ethics 2: Biomedical Ethics | | | | | | | x | x | | | |
| | Thermodynamics | x | | x | x | x | | | | | | |
| 2a | Physics and Technology of Medical Imaging | x | x | | | | | | | | | |
| | Signals and Systems | x | x | | | | x | | | | | |
| | Waves and Optics for BME | x | | x | | x | x | | | x | | x |
| 2b | Biological Physics | x | x | | | | | | | | | |
| | Electronics | | x | x | | | | | | | | |
| | *Biomedical Image Processing (E)* | | x | | | | x | | | | | |
| | *Surface characterization (E)* | x | | | x | x | | | | | | x |

Table 6.1. Continued

| **Year 3** | | **Learning outcomes** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A. Knowledge** | | | **B. Application of knowledge** | | | **C. Decision making** | | **D. Communication** | | |
| **Period** | **Course** | A1: math, biology, physics, (bio)chem, anatomy, physiology, engineering | A2: models and methods used in these fields, including computer-aided methods | A3: learning methods necessary to follow developments. Prepare for lifelong learning and Masters. | B1: apply knowledge for design of new solutions to biomedical problems | B2: perform measurements on biological systems and are able to interpret the data | B3: critically formulate the relevant questions, choose or propose appropriate methods, procedures and/or systems. | C1: key aspects of professional, ethical and societal responsibilities | C2: reflect on professional, ethical and social responsibilities | D1: understanding of functioning methods of multidisciplinary teams | D2: familiar with the established methods/tools of communication and their limitations | D3: effectively, clearly and unambiguously communicate their findings/results in a multidisciplinary setting |
| 1a | *Applied Medical Visualization (M)* | | x | | | | x | | | | | |
| | *Biofabrication (M)* | | | | | | x | | | | | x |
| | *Biomedical Instrumentation (M)* | | x | | x | x | | | | | | |
| | *Designing Biomedical Products 3 (M)* | | | | x | | x | x | | x | x | x |
| | *Microscopy and Imaging (M)* | | x | x | | x | | | | | x | x |
| | *Polymeric Materials for Biomedical Applications (M)* | x | | | x | | | | | | | |
| 1b | (Cell Biology and Immunology) | x | | | | | | | x | | | x |
| | Ethics 3: Research Ethics | | | | | | | x | x | | | |
| | Research course Biomedical Engineering | | | x | | | x | | | x | | x |
| 2a | Electronics | | x | x | | | | | | | | |
| | Tissue Engineering and Regenerative Medicine | | | | x | | | | | x | | |
| | *Biomedical Sensors (E)* | x | x | | | | | | | x | | |
| | *Imaging Laboratory 2 (E)* | | x | | | | | | | | | |
| | *Physicochemical Concepts in Bionanotechnology (E)* | x | x | | | | | | | | | |
| 2b | Bachelor's Project Biomedical Engineering | | | | x | x | x | x | x | x | | x |