

Anhang zum Studienplan Master Biomedical Engineering

Basic Modules (36 ECTS)

“Applied Mathematics”
(8 ECTS)

“Basics in Human Medicine”
(10 ECTS)

“Biomedical Engineering”
(18 ECTS)

Major Module (42-46 ECTS) “Biomechanical Systems”

Mandatory Courses (18 ECTS)

Electives (24-28 ECTS)

Recom. Electives (Max 20 ECTS)

Major Module (42-46 ECTS)

“Electronics Implants”

Mandatory Courses (18 ECTS)

Electives (24-28 ECTS)

Recom. Electives (Max 20 ECTS)

Major Module (42-46 ECTS)

“Image Guided Therapy”

Mandatory Courses (18 ECTS)

Electives (24-28 ECTS)

Recom. Electives (Max 21 ECTS)

Elective Preparation Courses (Max 11 ECTS)

General Elective Courses (Max 28 ECTS)

Module “Complementary Skills” (8-12 ECTS)

Mandatory Courses (6 ECTS)

Elective Courses (2-6 ECTS)

Master Thesis (30 ECTS)

Basic Modules (36 ECTS, mandatory)

Module “Basics in Human Medicine” (10 ECTS)

- Biological Principles of Human Medicine (4 ECTS), 1st Semester (Fall)
- Introductory Anatomy and Histology for Biomedical Engineers (3 ECTS), 1st Semester (Fall)
- Basics in Physiology (3 ECTS), 1st Semester (Fall)

Module “Applied Mathematics” (8 ECTS)

- Numerical Methods (5 ECTS), 1st Semester (Fall)
- Introduction to Medical Statistics (3 ECTS) 2nd Semester (Spring)

Module “Biomedical Engineering” (18 ECTS)

- (Bio)Materials (3 ECTS), 2nd Semester (Spring)
- Biomedical Instrumentation (3 ECTS), 1st Semester (Fall)
- Introduction to Biomechanics (3 ECTS), 1st Semester (Fall)
- Introduction to Signal Processing (3 ECTS), 1st Semester (Fall)
- Medical Informatics (3 ECTS), 1st Semester (Fall)
- Principles of Medical Imaging (3 ECTS), 1st Semester (Fall)

Major Modules (42-46 ECTS)

Elective Preparation Courses (0-11 ECTS)

Preparation courses are intended to fill gaps regarding prerequisites for basic and advanced courses in the master's program Biomedical Engineering. Technically, they belong to the elective courses in all Major Modules and can therefore be selected freely.

- Introduction to Electrical Engineering (2 ECTS), 1st Semester (Fall)
- Introduction to Engineering Mechanics (2 ECTS), 1st Semester (Fall)
- Introduction to Material Science (2 ECTS), 1st Semester (Fall)
- Introduction to Programming (2 ECTS), 1st Semester (Fall)
- Selected Chapters in Mathematics (2 ECTS), 1st Semester (Fall)
- Short Introduction to MATLAB (1 ECTS), 1st Semester (Fall)

Biomechanical Systems

Mandatory Courses (18 ECTS)

- BioMicrofluidics (3 ECTS), 3rd Semester (Fall)
- BME Laboratory (6 ECTS), 2nd Semester (Spring)
- Finite Element Analysis (3 ECTS), 2nd Semester (Spring)
- Fluid Mechanics (3 ECTS), 2nd Semester (Spring)
- Solid Mechanics (3 ECTS), 2nd Semester (Spring)

Recommended Elective Courses (20 ECTS)*

- Applied Biomaterials (3 ECTS), 3rd Semester (Fall)
- Cardiovascular Technology (3 ECTS), 3rd Semester (Fall)
- Design of Biomechanical Systems (2 ECTS), 3rd Semester (Fall)
- Functional Anatomy of the Locomotor Apparatus (3 ECTS), 3rd Semester (Fall)
- Movement Biomechanics (3 ECTS), 3rd Semester (Fall)
- Tissue Biomechanics Lab (3 ECTS), 3rd Semester (Fall)
- Tissue Engineering (3 ECTS), 3rd Semester (Fall)

Electronic implants

Mandatory Courses (18 ECTS)

- Biomedical Signal Processing and Analysis (3 ECTS), 2nd Semester (Spring)
- BME Laboratory (6 ECTS), 2nd Semester (Spring)
- Intelligent Implants and Surgical Instruments (3 ECTS), 3rd Semester (Fall)
- Low Power Microelectronics (3 ECTS), 2nd Semester (Spring)
- Wireless Communication for Medical Devices (3 ECTS), 2nd Semester (Spring)

Recommended Elective Courses (20 ECTS)*

- Biomedical Acoustics and Audiology (3 ECTS), 3rd Semester (Fall)
- Biomedical Sensors (3 ECTS), 2nd Semester (Spring 2022)
- Cardiovascular Technology (3 ECTS), 3rd Semester (Fall)
- Microsystems Engineering (3 ECTS), 2nd Semester (Spring)
- Neurotechnology (3 ECTS), 3rd Semester (Fall)
- Programming of Microcontrollers (5 ECTS), 3rd Semester (Fall)

Image-Guided Therapy

Mandatory Courses (18 ECTS)

- BME Laboratory (6 ECTS), 2nd Semester (Spring)
- Computer-Assisted Surgery (3 ECTS), 2nd Semester (Spring)
- Introduction to Image Analysis (3 ECTS), 2nd Semester (Spring)
- Medical Image Analysis (3 ECTS), 3rd Semester (Fall)
- Medical Robotics (3 ECTS), 2nd Semester (Spring)

Recommended Elective Courses (21 ECTS)*

- Biomedical Laser Applications (4 ECTS), 3rd Semester (Fall)
- Computer Vision (5 ECTS), 3rd Semester (Fall)
- Neurotechnology (3 ECTS), 3rd Semester (Fall)
- Ophthalmic Technologies (3 ECTS), 3rd Semester (Fall)
- Rehabilitation Technology (3 ECTS), 2nd Semester (Spring)
- Technology and Diabetes Management (3 ECTS), 3rd Semester (Fall)

General Elective Courses (not synchronised with individual modules)*

- Advanced Medical Imaging (2 ECTS), 2nd Semester, (Spring)
- Advanced Topics in Machine Learning (5 ECTS), 4th Semester (Spring)
- Applied Optimisation (5 ECTS), 3rd Semester (Fall)
- Artificial Intelligence (3 ECTS), 3rd Semester (Fall)
- C++ Programming I (3 ECTS), 2nd Semester (Spring)
- C++ Programming II (3 ECTS), 3rd Semester (Fall)
- Computer Graphics (German, 5 ECTS), 3rd Semester (Fall)
- Dynamical Models: Analysis, Conception and Simulation (3 ECTS), 2nd Semester (Spring)
- Finite Element Analysis II (3 ECTS), 3rd Semester (Fall 2022)
- Introduction to Digital Logic (3 ECTS), 2nd Semester (Spring 2022)
- Lecture Series on Advanced Microscopy (3 ECTS), 3rd Semester (Fall)
- Machine Learning (5 ECTS), 3rd Semester (Fall)
- Osteology (3 ECTS), 3rd Semester (Fall)
- Regenerative Dentistry for Biomedical Engineering (2 ECTS), 2nd Semester (Spring)
- Orthopaedic Surgery – Practical Course (2 ECTS), 4th Semester (Spring)
- Tissue Engineering - Practical Course (2 ECTS), 4th Semester (Spring)
- Image-Guided Therapy Project, (3 ECTS), 3rd Semester, (Fall)
- Medical Image Analysis Lab (4 ECTS), 3rd Semester (Fall)

Module “Complementary Skills” (8-12 ECTS)

Mandatory Part (6 ECTS)

- Ethics in Biomedical Engineering (2 ECTS), 3rd Semester (Fall)
- Fundamentals of Quality Management and Regulatory Affairs (4 ECTS), 2nd Semester (Spring)

Elective Part (2-6 ECTS)

- Clinical Epidemiology and Health Technology Assessment (2 ECTS), 2nd Semester (Spring)
- Innovation Management (2 ECTS), 3rd Semester (Fall)
- Scientific Writing in Biomedical Engineering (2 ECTS), 3rd Semester (Fall)

***: Apart from the Elective Courses (Preparation Courses, Recommended Elective Courses and General Elective Courses), any course listed in this document which is not mandatory for the student can be selected. However, course overlaps in the timetable may occur when non-recommended courses are selected.**