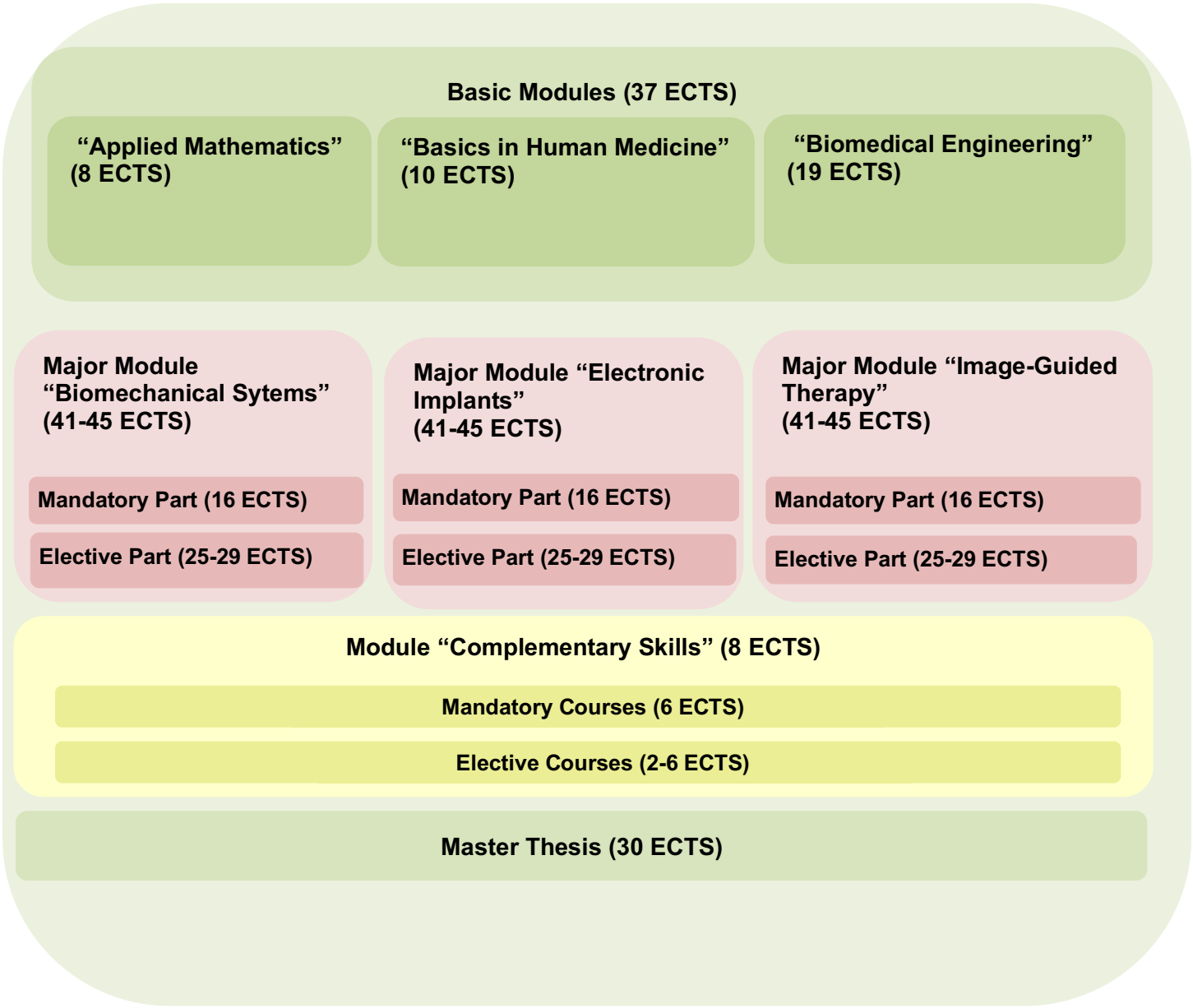
Anhang zum Studienplan Master Biomedical Engineering



Basic Modules (37 ECTS, mandatory)

Module "Basics in Human Medicine"

- 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"

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

Module "Biomedical Engineering"

- (Bio)Materials (5 ECTS), 2nd Semester (Spring)
- Biomedical Instrumentation (5 ECTS), 1st Semester (Fall)
- Introduction to Biomechanics (3 ECTS), 1st Semester (Fall)
- Medical Informatics (3 ECTS), 1st Semester (Fall)Principles of Medical Imaging (3 ECTS), 1st Semester (Fall)

Major Modules (41-45 ECTS)

Preparation Courses (0-9 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 Programming (2 ECTS), 1st Semester (Fall)
- Selected Chapters in Mathematics (2 ECTS), 1st Semester (Fall)
- Short Introduction to MATLAB (block course prior to the Fall Semester, 1 ECTS), 1st Semester (Fall)

Biomechanical Systems

Mandatory Courses (16 ECTS)

- Continuum Mechanics (3 ECTS), 2nd Semester (Spring)
- Finite Element Analysis I (3 ECTS), 2nd Semester (Spring)
- Fluid Mechanics (4 ECTS), 2nd Semester (Spring)
- Tissue Biomechanics (3 ECTS), 3rd Semester (Fall)
- Tissue Engineering (3 ECTS), 3rd Semester (Fall)

Recommended Elective Courses (30 ECTS)*

- Applied Biomaterials (3 ECTS), 3rd Semester (Fall)
- Basics of Applied Molecular Biology (1 ECTS), 3rd Semester (Fall)
- Biomechanics Labs (3 ECTS), 2nd Semester (Spring)
- BioMicrofluidics (2 ECTS), 3rd Semester (Fall)
- Cardiovascular Technology (3 ECTS), 3rd Semester (Fall)
- Lecture Series on Advanced Microscopy (3 ECTS), 3rd Semester (Fall)
- Design of Biomechanical Systems (3 ECTS), 3rd Semester (Fall)
- Finite Element Analysis II (3 ECTS), 3rd Semester (Fall)
- Functional Anatomy of the Locomotor Apparatus (3 ECTS), 3rd Semester (Fall)
- Intelligent Implants and Surgical Instruments (3 ECTS), 3rd Semester (Fall)
- Microsystems Engineering (3 ECTS), 2nd Semester (Spring)
- Dynamical Models: Analysis, Conception and Simulation (3 ECTS), 2nd Semester (Spring)
- Molecular and Cellular Biology Practical (2 ECTS), 4th Semester (Spring)
- Orthopaedic Surgery – Practical Course (2 ECTS), 4th Semester (Spring)
- Osteology (3 ECTS), 3rd Semester (Fall)
- Regenerative Dentistry for Biomedical Engineering (2 ECTS), 2nd Semester (Spring)
- Rehabilitation Technology (3 ECTS), 3rd Semester (Fall)
- Tissue Biomechanics Lab (2 ECTS), 3rd Semester (Fall)
- Tissue Engineering – Practical Course (2 ECTS), 4th Semester (Spring)

Electronic Implants

Mandatory Courses (16 ECTS)

- Biomedical Signal Processing and Analysis (3 ECTS), 2nd Semester (Spring)
- Intelligent Implants and Surgical Instruments (3 ECTS), 3rd Semester (Fall)
- Low Power Microelectronics (4 ECTS), 2nd Semester (Spring)
- Microsystems Engineering (3 ECTS), 2nd Semester (Spring)
- Wireless Communication for Medical Devices (3 ECTS), 2nd Semester (Spring)

Recommended Elective Courses (30 ECTS)*

- Applied Biomaterials (3 ECTS), 3rd Semester (Fall)
- Biomedical Acoustics (3 ECTS), 3rd Semester (Fall)
- Biomedical Laser Applications (4 ECTS), 3rd Semester (Fall)
- Biomedical Sensors (3 ECTS), 2nd Semester (Spring)
- BioMicrofluidics (2 ECTS), 3rd Semester (Fall)
- Cardiovascular Technology (3 ECTS), 3rd Semester (Fall)
- C++ Programming I (3 ECTS), 2nd Semester (Spring)
- C++ Programming II (3 ECTS), 3rd Semester (Fall)
- Finite Element Analysis I (3 ECTS), 2nd Semester (Spring)
- Finite Element Analysis II (3 ECTS), 3rd Semester (Fall)
- Introduction to Digital Logic (3 ECTS), 2nd Semester (Spring)
- Dynamical Models: Analysis, Conception and Simulation (3 ECTS), 2nd Semester (Spring)
- Programming of Microcontrollers (5 ECTS), 3rd Semester (Fall)
- Rehabilitation Technology (3 ECTS), 3rd Semester (Fall)
- Technology and Diabetes Management (3 ECTS), 3rd Semester (Fall)

Image-Guided Therapy

Mandatory Courses (16 ECTS)

- Computer-Assisted Surgery (3 ECTS), 2nd Semester (Spring)
- Introduction to Signal and Image Processing (5 ECTS), 2nd Semester (Spring)
- Medical Image Analysis (5 ECTS), 3rd Semester (Fall)
- Medical Robotics (3 ECTS), 2nd Semester (Spring)

Recommended Elective Courses (30 ECTS)*

- Advanced Topics in Machine Learning (5 ECTS), 4th Semester (Spring)
- Clinical Applications of Image-Guided Therapy (3 ECTS), 3rd Semester (Fall)
- Computer Graphics (German, 5 ECTS), 3rd Semester (Fall)
- Computer Vision (5 ECTS), 3rd Semester (Fall)
- C++ Programming I (3 ECTS), 2nd Semester (Spring)
- C++ Programming II (3 ECTS), 3rd Semester (Fall)
- Finite Element Analysis I (3 ECTS), 2nd Semester (Spring)
- Finite Element Analysis II (3 ECTS), 3rd Semester (Fall)
- Functional Anatomy of the Locomotor Apparatus (3 ECTS), 3rd Semester (Fall)
- Image-Guided Therapy Lab (3 ECTS), 2nd Semester (Spring)
- Intelligent Implants and Surgical Instruments (3 ECTS), 3rd Semester (Fall)
- Machine Learning (5 ECTS), 3rd Semester (Fall)
- Medical Image Analysis Lab (4 ECTS), 3rd Semester (Fall)
- Microsystems Engineering (3 ECTS), 2nd Semester (Spring)
- Dynamical Models: Analysis, Conception and Simulation (3 ECTS), 2nd Semester (Spring)
- Ophthalmic Technologies (3 ECTS), 3rd Semester (Fall)
- Programming of Microcontrollers (5 ECTS), 3rd Semester (Fall)

Module “Complementary Skills” (8 ECTS)

Mandatory Part (6 ECTS)

- Innovation Management (2 ECTS), 3rd Semester (Fall)
- Regulatory Affairs and Patents (4 ECTS), 2nd Semester (Spring)

Elective Part (2-6 ECTS)

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

***: Apart from the recommended 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.**