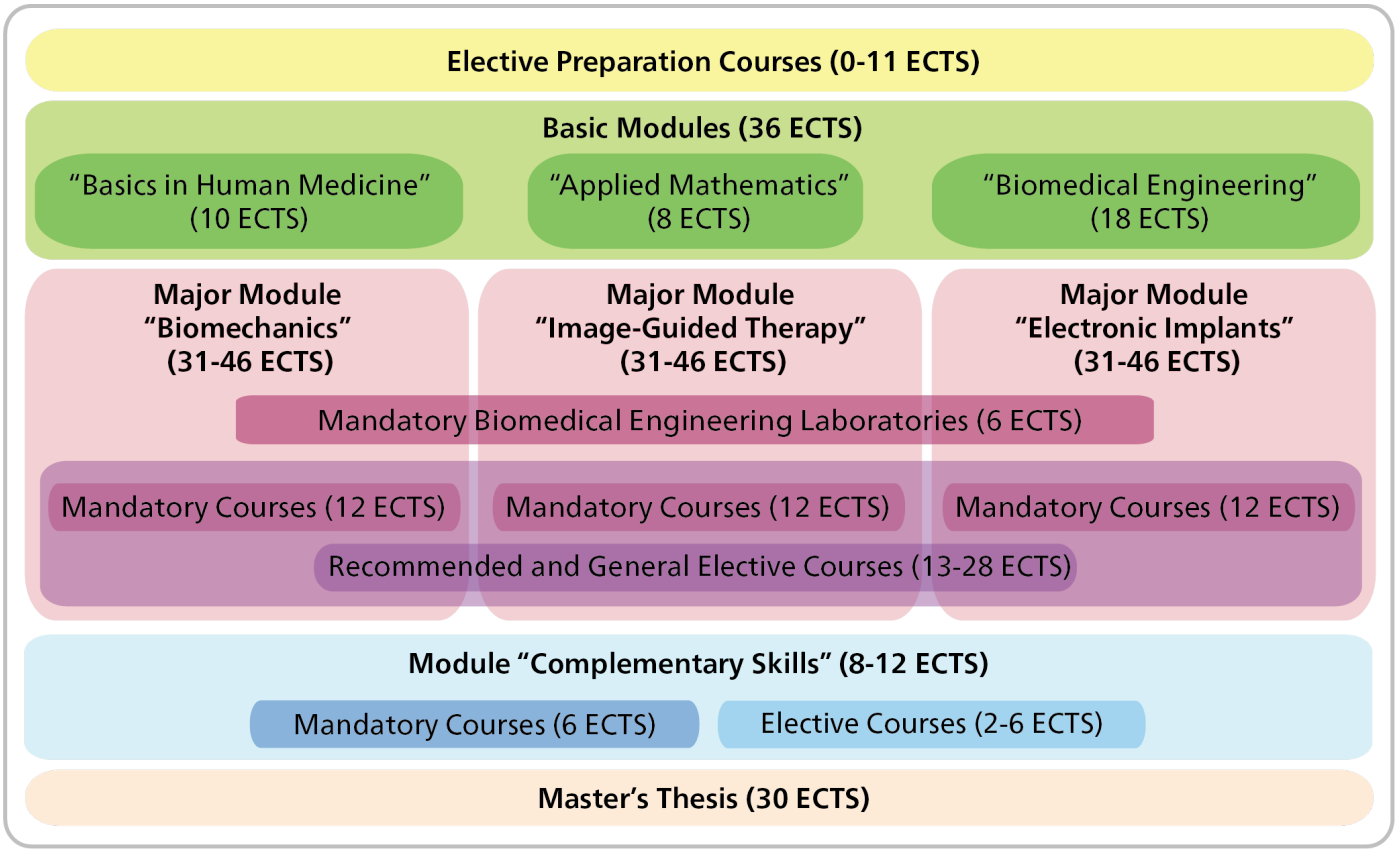
Master's Program Biomedical Engineering (120 ECTS Credits)

Course Structure – Fall Semester 2024



Bern University of Applied Sciences

UNIVERSITÄT BERN

Courses in the first semester (fall)

Preparation Courses (Electives)

	ECTS
Introduction to Electrical Engineering	2
Introduction to Engineering Mechanics	2
Introduction to Material Science	2
Introduction to Programming	2
Selected Chapters in Mathematics	2
Short Introduction to MATLAB	1

Basic Modules (mandatory courses)

Applied Mathematics	**ECTS**
Numerical Methods	5
Basics in Human Medicine	
Basics in Physiology for Biomedical Engineering	3
Biological Principles of Human Medicine	4
Introductory Anatomy and Histology for Biomedical Engineers	3
Biomedical Engineering	
Biomedical Instrumentation	3
Introduction to Biomechanics	3
Introduction to Digital Signal Processing	3
Medical Informatics	3
Principles of Medical Imaging	3

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

Courses in the second semester (spring)

Basic Modules (mandatory courses)

Applied Mathematics	ECTS
Introduction to Medical Statistics	3
Biomedical Engineering	
(Bio)Materials	3

Complementary Skills

Mandatory Courses	ECTS
Fundamentals of Quality Management and Regulatory Affairs	4
Elective Courses	
Clinical Epidemiology and Health Technology Assessment	2

Major Modules

Biomechanics – Mandatory Courses	ECTS
BME Laboratory	6
Finite Element Analysis I	3
Fluid Mechanics	3
Solid Mechanics	3

Electronic Implants – Mandatory Courses	ECTS
Biomedical Signal Processing and Analysis	3
BME Laboratory	6
Low Power Microelectronics	3
Biomedical Sensors	3
Electronic Implants – Recommended Elective Courses**	
Microfluidic Sensing – BioChips	3
Microsystems Engineering	3

Image-Guided Therapy – Mandatory Courses	ECTS
BME Laboratory	6
Computer-Assisted Surgery	3
Introduction to Image Analysis	3
Medical Robotics	3
Image-Guided Therapy – Recommended Elective Courses**	
Rehabilitation Technology	3

General Elective Courses**	ECTS
Advanced Medical Imaging	2
C++ Programming I	3
Deep Learning. This course is recommended for the 4th semester.	5
Dynamical Models: Analysis, Conception and Simulation	3
Grundkurs Programmieren (in German)	3
Introduction to Data Science with Python. This course is recommended for the 4th semester.	5
Introduction to Digital Logic (1-week block course between fall and spring semester)	2
Regenerative Dentistry for Biomedical Engineering	2
Tissue Engineering Practical Course (2-week block course after the fall semester): 4th semester	2

**In addition to the Recommended and General Elective Courses, any course listed in this document which is not mandatory f
the student can be selected. However, course overlaps in the timetable may occur when non-recommended courses are selec

Courses in the third semester (Fall)

Complementary Skills

Mandatory Courses	ECTS
Ethics in Biomedical Engineering	2
Elective Courses	
Innovation Management	2
Scientific Writing in Biomedical Engineering	2

Major Modules

Biomechanics – Mandatory Courses	ECTS
BioMicrofluidics	3
Biomechanics – Elective Courses (Recommended)**	
Applied Biomaterials	3
Cardiovascular Technology	3
Design of Biomechanical Systems	2
Functional Anatomy of the Locomotor Apparatus	3
Movement Biomechanics	3
Tissue Biomechanics Lab	3
Tissue Engineering	3

Electronic Implants – Mandatory Courses	
Intelligent Implants and Surgical Instruments	3
Electronic Implants – Elective Courses (Recommended)**	
Biomedical Acoustics and Audiology	3
Cardiovascular Technology	3
Neurotechnology	3
Programming of Microcontrollers	5

Image-Guided Therapy – Mandatory Courses	
Medical Image Analysis	3
Image-Guided Therapy – Elective Courses (Recommended)**	
Computer Vision	5
Data Driven Diabetes Management	3
Medical Image Analysis Lab	4
Neurotechnology	3
Ophthalmic Technologies	3

General Elective Courses**	ECTS
Applied Optimization	5
Biomedical Laser Applications	4
C++ Programming II	3
Computer Graphics (German)	5
Finite Element Analysis II	3
Grundkurs Programmieren (in German)	3
Introduction to Artificial Intelligence	5
Lecture Series in Advanced Microscopy	3
Machine Learning	5
Orthopaedic Surgery – Practical Course (1-week block course before the fall semester)	2
Osteology	3

**In addition to the Recommended Elective Courses, any course listed in this document which is not mandatory for the studer can be selected. However, course overlaps in the timetable may occur when non-recommended courses are selected.