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**UNIVERSITY  
OF BERN**

**ARTORG CENTER**  
BIOMEDICAL ENGINEERING RESEARCH

# Master of Science Biomedical Engineering



More Info



[www.bme.master.unibe.ch](http://www.bme.master.unibe.ch)



Biomedical  
Engineering Club



Bern University  
of Applied Sciences

## Key Features

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- Two-year full-time program, part-time work possible
- International program in English
- Affiliated to a leading medical faculty in Switzerland: Inselspital, University Hospital Bern
- Oriented towards clinical applications
- Attractive location

## Admission Requirements

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### **BSc (FH/HES/SUP/Uni) in**

- Electrical Engineering
- Mechanical Engineering
- Mechatronics Engineering
- Microtechnology
- Systems Engineering
- Physics
- Computer Science
- Related fields

## Major Modules

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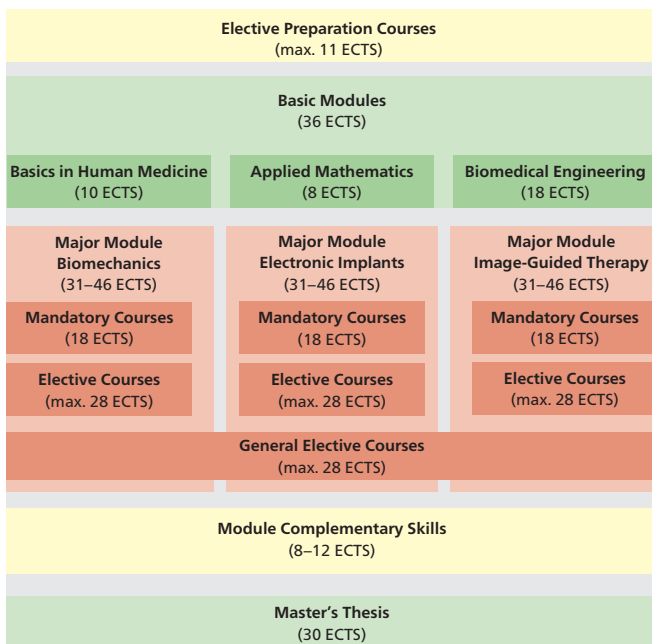
- Biomechanics
- Electronic Implants
- Image-Guided Therapy

## Perspectives

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- Excellent job opportunities in industry, research institutions and hospitals
- Doctoral studies accessible
- BME alumni network

# Course Structure



## The Curriculum

### Duration of Studies and Part-Time Work

The full-time study program takes 4 semesters which corresponds to 120 ECTS points, one ECTS point being defined as 25–30 hours of student workload. It can be extended to a maximum of 6 semesters.

When a student decides to complete the studies in parallel to a part-time professional occupation, further extension is possible on request. However, it is recommended not to exceed a workload of 40%. To support regular part-time work, mandatory courses take place (with rare exceptions) on only 3 days per week.

### Elective Preparation Courses

Preparation courses are intended to fill gaps regarding prerequisites for basic and advanced courses in the master's program Biomedical Engineering.

## **Basic Modules**

In the basic modules students acquire relevant background knowledge which enables them to understand the highly complex subject matter in the specialized courses. All students with an engineering background have to complete all courses in the Basic Modules "Basics in Human Medicine", "Applied Mathematics", and "Biomedical Engineering". In the first semester, all mandatory courses belong to this group, whereas in the second semester, the basic modules make up for approximately 25%.

## **Major Modules**

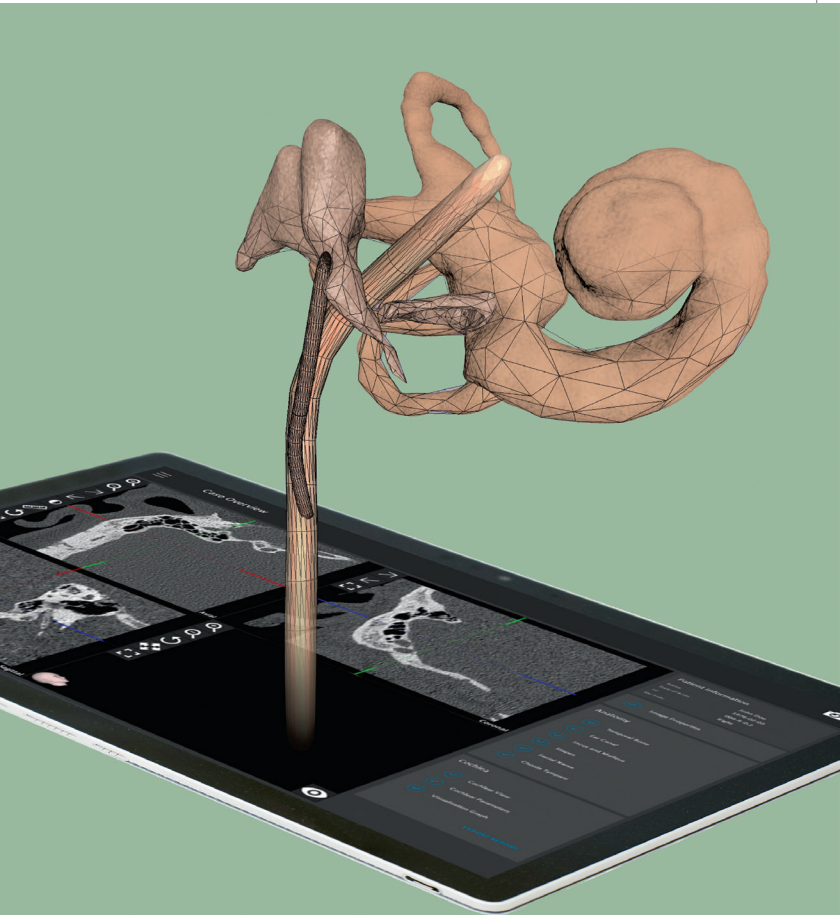
The choice of one of three major modules Biomechanics, Electronic Implants, or Image-Guided Therapy after the first semester constitutes the first opportunity for specialization. Approximately one third of the courses in each major module are mandatory. In the elective part of the major module, students are allowed to select any course from the list of courses in the master's program, giving rise to a high degree of diversity and flexibility and allowing for numerous course combinations. However, this freedom makes it somewhat difficult for the student to make reasonable choices regarding professional prospects. This is why the responsible lecturers developed a recommended study plan to guide the students through the course selection process. If students follows these recommendations, he or she can be sure to establish a sound professional profile.

## **Module Complementary Skills**

Apart from the rapid development of technology itself, today's biomedical engineers are increasingly challenged by complementary issues like ethical aspects, project planning, quality assurance and product safety, legal regulations and intellectual property rights, as well as marketing aspects. Language competence in English is of paramount importance both in an industrial and academic environment. This situation has been accounted for by the introduction of the module "Complementary Skills" where students are required to complete two mandatory courses (Ethics in Biomedical Engineering; Fundamentals of Quality Management and Regulatory Affairs) as well as 2 ECTS from the elective courses (Innovation Management; Scientific Writing in Biomedical Engineering; Epidemiology and Health Technology Assessment).

## Master's Thesis

The last semester is dedicated to a master's thesis project on an individually suited topic in an associated research group or, for particular cases, in an industrial R&D environment. As a rule, all 90 ECTS from the course program have to be completed, thus ensuring that each student is able to fully concentrate on the challenges imposed by exciting research activities. The master's thesis includes the thesis paper, a thesis defense as well as a one-page abstract for publication in the annual report of the master's program.



### Image-Guided Therapy

Photorealistic rendering of relevant anatomical structures for ear surgery planning based on computed tomography images.

Graphics: Catherine Tsai

## Major Modules

### Electronic Implants

Electronic implants are devices like cardiac pacemakers and cochlear implants. Due to miniaturization and other developments, many new applications become feasible and this exciting area is growing rapidly. In this module, students will learn about the basics of electronic implants. This includes: signal processing and analysis, low-power microelectronics, wireless communications, and MEMS technology. Application-oriented elective courses are also taught, e.g., neurotechnology, biomedical acoustics, and biomedical sensors.

### Image-Guided Therapy

Image-Guided Therapy refers to the concept of guiding medical procedures and interventions through perceiving and viewing of medical image data, possibly extended by using stereotactic tracking systems. Guidance is realized by various means of determination of spatial instrument-to-patient relationship and by suitable visualizations. Students of the IGT module will be introduced to the fundamentals of clinical and technical aspects of image-guided therapy. They will receive an overview of currently applied clinical standards as well as an overview of latest advancements in research.

### Biomechanics

The functions of our cardiovascular, musculoskeletal, and respiratory systems rely critically on biomechanical principles. Diseases affecting these systems such as atherosclerosis, osteoporosis or lung cancer, represent major burdens not only for individual but also for public health. In this module, students will acquire the knowledge to understand the structure-mechanical function relationships of cells, tissues, biomaterials, organs, systems and medical devices as well as the multidisciplinary engineering skills to help resolving unmet clinical needs.

## Information Events

([www.bme.master.unibe.ch/infoevents](http://www.bme.master.unibe.ch/infoevents))

### Master Information Events BFH

(October to May, on-site and online events)

### Master's Open Days, University of Bern

(March, on-site and online events)

### Biomedical Engineering Day

(May, Inselspital Bern)

## Application Deadline

### Regular Registration: April 30

### Late Registration: August 31

(Only if the student does not require a visa for entering and residing in Switzerland)

## Contact

### University of Bern

MSc Biomedical Engineering

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[www.bme.master.unibe.ch](http://www.bme.master.unibe.ch)

## Student and Alumni Organization



Biomedical  
Engineering Club

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