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Master of Science in Biomedical Engineering

Program Overview

Content

The Master's Program at a Glance

Master of Science in Biomedical Engineering

- 2 Introduction
 - Cooperation Master
- 3 Perspectives

Modules

- 4 Basic Modules
 - Specializations
- 7 Major Module «Biomechanical Systems»
 - Major Module «Electronic Implants»
 - Major Module «Image-Guided Therapy»
- 9 Module «Complementary Skills»
 - Master's Thesis
- 11 Structure of the Program
- 13 Practical Relevance

Study information

- 14 Locations
 - Admissions
 - Costs
- 15 Beginning of Studies
 - Duration
 - Language, International Skills and Experience
 - Registration

16 Information Days

16 Biomedical Engineering Day

The Master's Program at a Glance

With a Master of Science in Biomedical Engineering you will be able to actively contribute and innovate within the medical technology industry.

Specializations	Biomechanical Systems Electronic Implants Image-Guided Therapy
Mode of Study	4 semesters (full time) Extension and part-time studies possible
Language of Instruction	English
Locations	Bern (predominantly), Biel
Costs	Approximately 800 CHF / semester One-time fees: enrollment fee (100 CHF), exam fees (300 CHF)
Beginning of Studies	September
Admission Requirement	Bachelor's degree in most engineering disciplines and physics. Other graduates can be admitted based on individual achievements.
Application Deadline	April 30 or August 31 for late registrations
Title	Master of Science in Biomedical Engineering

Master of Science in Biomedical Engineering

2 Introduction

Biomedical engineering is one of the most promising fields of research, and a source of economic opportunities in the 21st century. Thanks to increasing life expectancy, its global development and growth potential is far above average. In Switzerland, medical technology is a particularly well-established industry that has reached very high standards. Swiss companies are among the global leaders in many key business areas in the field. Start-ups and enterprises that occupy market niches have the chance to reap extraordinary rewards.

Cooperation Master

In order to respond to the high demand for well-trained biomedical engineering professionals in Switzerland, this unique two-year state-of-the-art master's program was initiated in 2006. The program is assigned to the Faculty of Medicine of the University of Bern and is offered in close cooperation with the Bern University of Applied Sciences. Through its association with the Bern University Hospital (Inselspital) and its close ties to companies, it is oriented towards

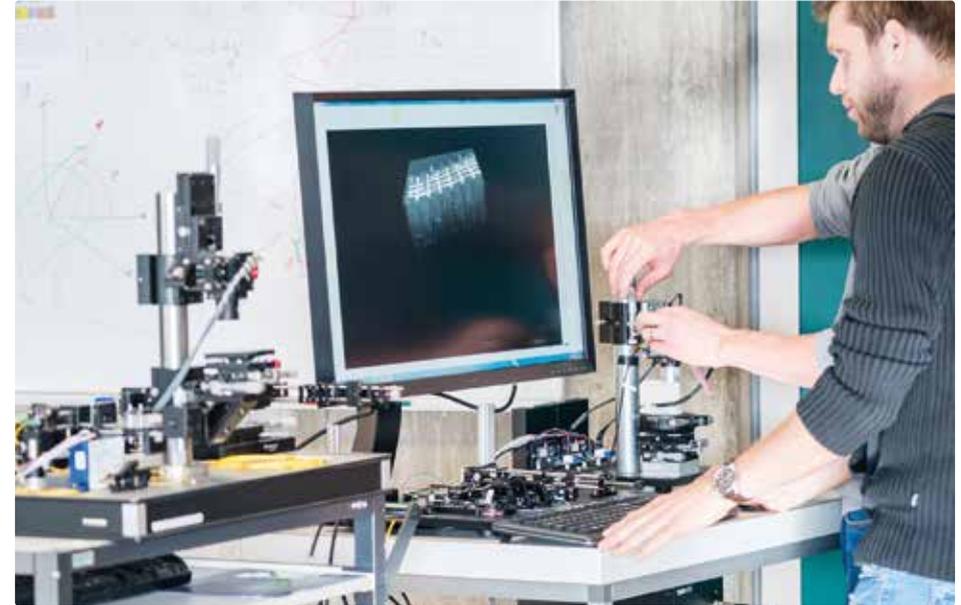


clinical applications. Engineering graduates from both universities and universities of applied sciences may join this international program in English. Successful students acquire a full-fledged university master's degree which allows them to continue their education towards a PhD degree. Career prospects in both industrial and academic environments are excellent.

Perspectives

Medical technology is an important sector in Switzerland with a strong network of companies and institutions. Well-trained and qualified specialists are in high demand in the labor market.

Graduates of this program are often employed in research and development departments in the medical technology sector and are well equipped for future management positions. Approximately one-quarter of them go on to complete their doctorate afterwards.



Modules

4 Basic Modules

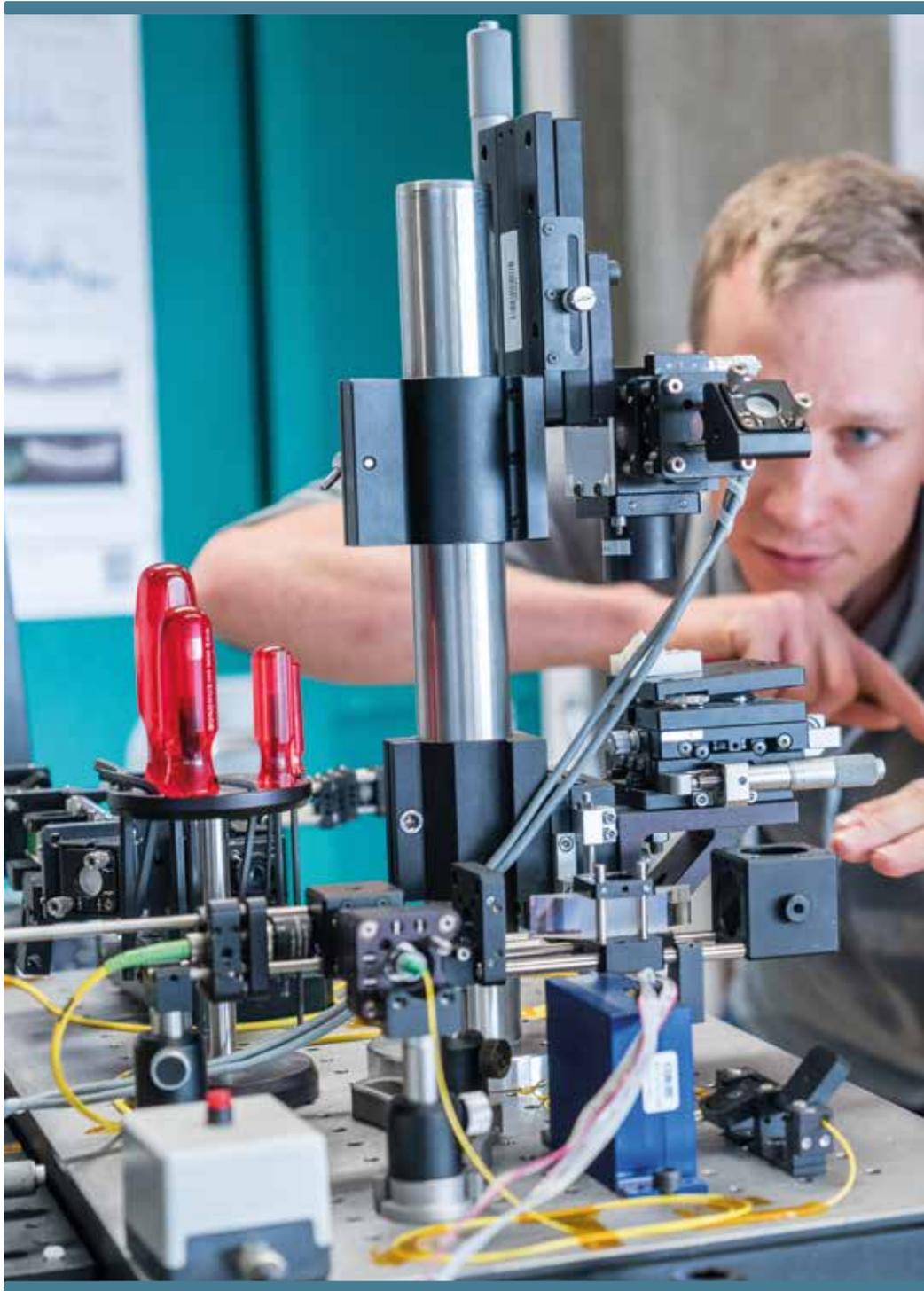
The basic modules provide the students with the necessary background to fully understand the highly complex subject matter in the specialized courses. All students with an engineering background have to complete all courses in the Basic Modules «Basics in Human Medicine», «Applied Mathematics», and «Biomedical Engineering». In the first semester, all mandatory courses belong to this group, whereas in the second and third semester, the courses from the basic modules make up for approximately 25–30%.

Specializations (Major Modules)

Approaching the end of the first semester, students have the option to choose from one of three specialized major modules: Biomechanical Systems, Electronic Implants, or Image-Guided Therapy. Approximately one-third of the major modules consist of mandatory courses. 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 for numerous course combinations. However, this freedom makes it somewhat difficult for students 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 and to avoid organizational problems such as overlapping courses. If students follow the recommended path, they can be sure to establish sound professional profiles.

While studying for the Master of Science in Biomedical Engineering, you benefit from a wide selection of advanced modules and can experience a tailor-made degree program.





Major Module «Biomechanical Systems»

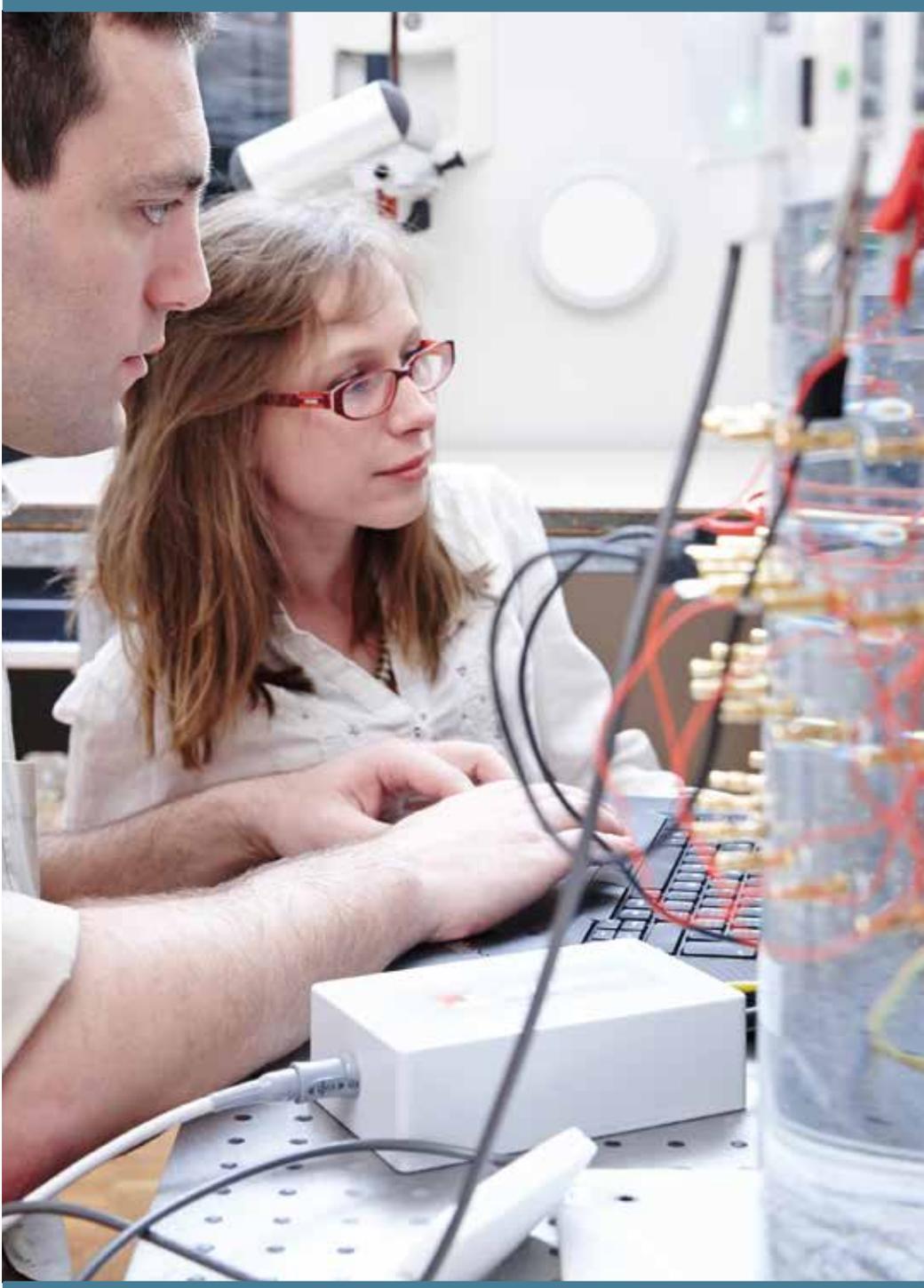
Biomechanical systems are biological organs or man-made devices that fulfill a primary mechanical function such as the pumping of blood or moving a skeletal segment. Musculoskeletal injuries and pathologies as well as cardiovascular diseases are the costliest ailments facing our health care systems. In this module, students will gain a comprehensive understanding and the analytical skills for investigation of biomechanical systems. They will acquire engineering, biological and medical theories to contribute to the resolution of complex biomechanical and mechano-biological problems.

Major Module «Electronic Implants»

Electronic implants are devices like cardiac pacemakers and cochlear implants. Due to miniaturization and other developments, many new applications are now 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., diabetes management, biomedical acoustics, and biomedical sensors.

Major Module «Image-Guided Therapy»

Image-guided therapy refers to the concept of guiding medical procedures and interventions through analyzing medical image data, possibly extended by using stereotactic tracking systems. Guidance is realized by various means including the determination of spatial instrument-to-patient relationship and 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 current clinical standards as well as an overview of latest advancements in research.



Module «Complementary Skills»

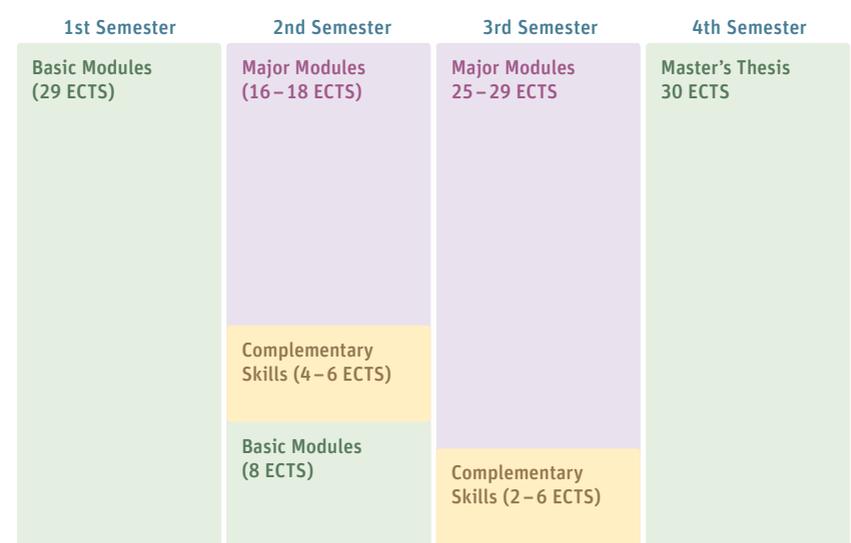
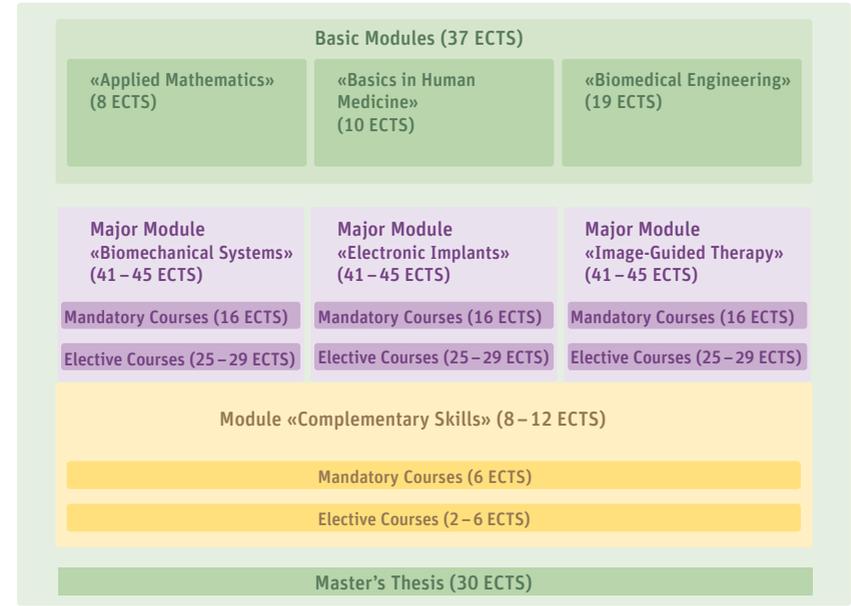
Apart from the rapid development of technology itself, today's biomedical engineers are increasingly challenged by complementary issues like ethical aspects, project planning, quality assurance and product safety, legal regulations and intellectual property rights, as well as marketing aspects. Language competence in English is of paramount importance in both industrial and academic environments. This situation has been accounted for by the introduction of the module «Complementary Skills» in which students are required to complete two mandatory courses (Ethics in Biomedical Engineering; Quality Management and Regulatory Affairs) as well as 2 ECTS from the elective courses (Innovation Management; Scientific Writing in Biomedical Engineering; Clinical 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 research and development environment. As a rule, all 90 ECTS credits from the course program have to be completed, thus ensuring that the 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.



Structure of the Program





«Thanks to my BSc in Micro- and Medical Technology and my MSc in Biomedical Engineering, I have the possibility to work at the forefront of exciting research projects».

Daniel Kaufmann
MSc in Biomedical Engineering

Practical Relevance

Due to the fact that most courses are held only three days per week, students have the possibility to gain additional experience in a part-time job, quite frequently as a research assistant at an institute or in the medtech industry. During the course period, students have the possibility to attend a number of project-based elective courses. During the last semester, students work on a master's thesis to apply the theory learned. Due to our large network of academic, clinical and industrial partners, projects from a broad range of subjects are offered. The practical relevance of the projects improves the employability of our graduates.

As an engineering graduate from a Swiss university of applied sciences, you can enter this program without further prerequisites.

Locations

Most courses take place in Bern.

Students of the specialization Electronic Implants occasionally have courses in Biel. Usually, the master's thesis is done at the University of Bern or the BFH and can be carried out in one of the institutes at Bern, Biel or Burgdorf. In some cases, the work can be completed in industry or outside of Switzerland.

Admissions

The Master of Science in Biomedical Engineering program is offered by the University of Bern in close cooperation with the Bern University of Applied Sciences. This cooperation allows engineering graduates from the Swiss universities of applied sciences to enter a university-level master's program without further preconditions.

In particular, students with a recently obtained Swiss bachelor's degree in microtechnology, systems engineering, electrical engineering, mechanical engineering, automotive engineering, physics and computer science are admitted without preconditions.

Students with other or non-Swiss degrees may also apply for admission. All students have to apply for admission at the University of Bern: bme.master.unibe.ch.

The deadline for applications is April 30, and August 31 for late applications.

Costs

The one-time registration fee is 100 CHF (200 CHF for late registrations). The semester fee is approximately 800 CHF.

An exam fee of 150 CHF has to be paid both at the beginning of studies and before graduation.

Beginning of Studies

Fall semester (calendar week 38)

Duration

The full-time study program takes 4 semesters, which corresponds to 120 ECTS credits, 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 to not exceed a workload of 40%. To support regular part-time work, mandatory courses take place (with rare exceptions) only 3 days per week.

Language, International Skills and Experience

All courses are taught in English and students usually write their master's thesis in English. Therefore, students will be able to improve their English during this two-year program. In addition, an exchange semester abroad is possible, either during the course period or for the master's thesis.

Registration

Online registration at studis.unibe.ch

Information Days

- 16 The Bern University of Applied Sciences provides further information on the Master of Science in Biomedical Engineering at special information events during the spring season. Our students and lecturers will be personally available to present projects and to answer questions.
ti.bfh.ch/master

In addition, every spring, the University of Bern offers the Master's Open Days. An information event, a guided lab tour and participation in selected courses provide the opportunity to meet fellow students and lecturers.
bme.master.unibe.ch/events/information_events

We are looking forward to your visit!

Biomedical Engineering Day

The Biomedical Engineering Day, a career day, takes place at Inselspital Bern in May. It provides an excellent opportunity for future students to get comprehensive insight into the biomedical engineering environment in Bern in general and the master's program in particular. The event consists of an impressive research and industrial exhibit and a diverse program. Besides several industrial and scientific talks, the program includes a live surgery and a science slam.
bme.master.unibe.ch/events/bme_day

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