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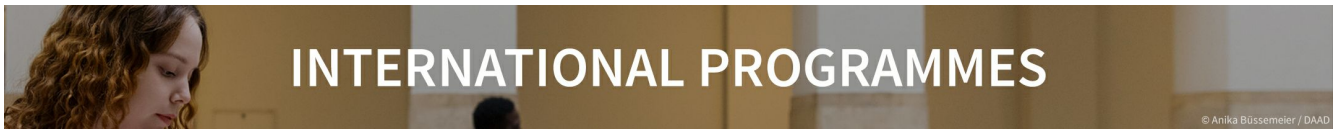
German Academic Exchange Service



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Master's degree

Biomedical Engineering

RWTH Aachen University • Aachen





Overview

Degree	Master of Science
In cooperation with	The programme offers close cooperation with clinics, research institutes and industry, for example, the Helmholtz Institute or DWI Leibniz Institute or the companies Abiomed and Philips.
Teaching language	• English
Languages	All courses are held in English including the internship and the Master's thesis.
Full-time / part-time	• full-time
Programme duration	4 semesters
Beginning	Winter semester
Additional information on beginning, duration and mode of study	After you received an acceptance from RWTH Aachen University for this BME programme, you are able to enrol online at RWTH Aachen University. The best time to enrol online at RWTH Aachen is: • at the beginning of May for the non-EU students and • at the beginning of September for EU students. • The deadline for enrolment for all students is end of October. The **winter semester starts on 1 October** and the start of the lectures is around 10 October. At this time, all students have to be in Aachen. This BME programme is offered **only in full-time study** and only single study is allowed – no double study is permitted. The study programme is **offered almost exclusively in presence**. Therefore, all students must arrive at the university on time. Attendance at lectures is voluntary at RWTH Aachen. However, attendance is compulsory for seminars, exercises and practical parts. At the end of each semester, written or oral **exams are offered almost exclusively face-to-face.** Some courses are recorded and also stored digitally on RWTHOnline. Lecture content is mainly made available to students digitally via RWTH Moodle.

Application deadline	Please ensure that all required documents are uploaded as soon as possible on RWTHonline. **Deadline for non-EU students**: We recommend submitting applications by January, but not later than the **deadline of 1 March**. The International Office is responsible for processing applications and assessment for the fulfilment of the formal requirements. Admission/rejection letters will be sent out by the beginning of May at the earliest. **Deadline for EU students**: We recommend submitting applications by May, but not later than the **deadline 15 July**. The Registrar's Office is responsible for processing applications, assessment for the fulfilment of the formal requirements. Admission/rejection letters will be sent out by the beginning of August at the earliest.
Tuition fees per semester in EUR	None
Combined Master's degree / PhD programme	No
Joint degree / double degree programme	No
Description/content	Biomedical Engineering is a dynamic multidisciplinary scientific field that combines Medicine and Engineering with Natural Sciences like Biology, Mathematics, Physics and Chemistry. At RWTH Aachen University, this Master's programme is the only programme that ends with an independent degree in **Master of Science in Biomedical Engineering**(BME) and is much more than just a field of specialisation. The aim of this research-based Master’s programme is to develop theoretical and practical methods and continuous acquisition of knowledge, competences and qualifications. Another major goal is to apply engineering principles and design concepts to medicine to solve human health problems through early detection, diagnosis, therapy as well as prevention of diseases. The curriculum is designed to provide not only a general background in Biomedical Engineering but also a specific **Aachen profile** with regard to the current research in the Biomedical Engineering department. Focal points of this profile are: • **Medical Imaging Techniques** Including the modules Medical Imaging, Image Guided Therapy and Theranostics and Image Processing and Handling • **Tissue Engineering** Including the module Cell Culture and Tissue Engineering • **Materials Science** Including the modules Materials Science and Processing, Advanced Biomaterials – Hard Tissue Implants and Prostheses & 3D Bioprinting • **Artificial Organs** Including the module on Artificial Organs with focus on Heart, Kidney, Lung and Liver An absolutely unique selling point of the Master's programme Biomedical Engineering at RWTH Aachen University is the **parallel teaching of all four focus areas**which offers students a broad spectrum of engineering and medical technology – thereby improving their technical skills. Our international academic environment enables students to get hands-on international, intercultural academic work experience, giving them the opportunity to further develop their soft skills. All these skills enable the graduates to work in medical technology research or development and provides the foundation for a later PhD. The graduates will have a broad in-depth theoretical and practical knowledge of Natural Sciences, Medicine and Engineering.

Typical research areas include physiology of molecular and cellular systems, physiology of organ systems, medical imaging techniques, robotics and artificial organs, tissue engineering and materials science.

Graduates are not only able to analyse and solve technical and scientific problems, but also to critically question the conception thereof and to handle and document complex problems in research and development independently. They are able to report the results appropriately using current technical language and terminology.

The Master's programme is interdisciplinary and involves the following departments: Medicine, Computer and Natural Sciences, Mechanical Engineering, and Electrical Engineering and Information Technology.

Course Details

Course organisation

The BME programme is offered in a group size of approximately 50 students and thus enables individual support of the student as well as optimal teaching transfer and development of the technical content.

The interdisciplinary programme has a modular design and is divided into **mandatory, elective mandatory and optional modules**. This wide range of modules offered by the four participating departments ensures that the individual interests and creativity of each student are promoted in the best possible way.

The programme contains three semesters of lectures, seminars, exercises and practical modules. After each semester students are assessed with written or oral exams.

Another part of the programme is the full-time six to eight-week **internship** in the second semester. This internship is an opportunity to put acquired knowledge into practice and gather experience in the professional surrounding of Biomedical Engineering either in an institute or a company. Another important goal of the internship is to practice various skills in a given time (planning and preparation, data collection, analysis, and writing). In the internship, either a concrete scientific problem is dealt with or practical methodological skills are trained and deepened.

The **Master's thesis** is an predefined scientific project to be completed in a fixed period of four to six months. Knowledge and experience gained in previous study modules are to be applied in the Master's thesis. It can be done in a company or in an institute. It is an experimental work and it is concluded by an oral presentation and defence of the results. The Master's thesis demonstrates that the student is able to independently work on a concrete scientific problem under supervision within a given period using scientific methods in the field of Biomedical Engineering.

The curriculum and course content is structured in accordance with the ECTS (European Credit Transfer System). After successful completion of the study programme 120 ECTS credits will be required. The distribution is as followed:

- General modules: 70 credits
- Elective mandatory modules: 10 credits
- Internship: 10 credits
- Master's thesis: 30 credits

The Master's programme utilises the following basic forms of **theoretical teaching** to achieve the defined goals:

- lectures: a serial presentation of material including specific methodologies
- seminars: course in which the students work on specific topics under scientific guidance.

Furthermore, it includes the following **practical teaching** forms to achieve the defined goals:

- practical work directly related to lectures
- exercises directly related to lectures
- internship
- Master's thesis

	The **curriculum** of the programme is offered in the **pdf file** below. » PDF Download
A Diploma supplement will be issued	Yes
International elements	• Specialist literature in other languages • Language training provided • Training in intercultural skills • Projects with partners in Germany and abroad • International comparisons and thematic reference to the international context • Content-related regional focus
Integrated internships	Students are required to complete an internship with a duration of six to eight weeks as an integrated and mandatory part of their curriculum after the second semester in the semester free time. It can be done in an institute or company either here or abroad. The internship gives students the opportunity to gain practical experience and insights into current research projects. This is often the first step towards the student's future professional career.
Special promotion / funding of the programme	• DAAD • ERASMUS+ • Other (e.g. state level) • DFG (e.g. Research Training Groups) • Helmholtz Graduate Schools
Name of DAAD funding programme	DAAD Cap Matching Funds; DAAD funding programme STIBET I
Course-specific, integrated German language courses	No
Course-specific, integrated English language courses	No

Costs / Funding

Tuition fees per semester in EUR	None
Semester contribution	**Per semester approximately 300 EUR** student services contribution The fee includes a semester ticket covering public transport in all of North Rhine-Westphalia.
Costs of living	The cost of living and studying, including food, accommodation, personal and social expenses, and study-related costs, is estimated to be **1,100 EUR per month** Please note that single individuals have to give proof of a minimum income of 861 EUR per month at the immigration office in Aachen in order to be eligible for an extension of the residence permit (as

of July 2022).

Funding opportunities within the university	Yes
Description of the above-mentioned funding opportunities within the university	In Germany, universities do not offer full-coverage scholarships. Prospective and current RWTH students, however, may apply for a scholarship from the Education Fund, which is worth 300 EUR per month. Additionally, there are a number of trusts and foundations which offer scholarships. A full list of programmes and foundations can be found in the RWTH scholarships database: http://www.rwth-aachen.de/go/id/ehg/lidx/1.

Requirements / Registration

Academic admission requirements	Entrance requirement for this MSc Biomedical Engineering study programme is an undergraduate degree from a national or international university – **Medicine, Bachelor of Science, Bachelor of Engineering or in a related study** by which the educational requirements can be proven. A change from one university to another university is easier than from a university of applied sciences to a university. Undergraduate degrees are only acceptable from universities that are accredited by the state, in which the university is located or through officially recognised procedures. **The educational requirements** of the undergraduate degrees should include knowledge (90 credit points (CP) of the European Credit Transfer System) in the fields of Engineering, Mathematics / Natural Sciences with at least the following CP in these four fields: **Mathematics: 20 CP** advanced mathematics; linear algebra (vector analysis and tensor analysis), analysis (differential calculus and integral calculus) numeric methods **Chemistry: 20 CP** advanced chemistry; anorganic chemistry, organic chemistry, biochemistry, physical chemistry **Biology: 20 CP** advanced biology; human cell biology, genetics, microbiology, molecular biology, human physiology, human anatomy **Physics and Engineering Technology: 30 CP** advanced physics; mechanics, electrotechnics, thermodynamics, nuclear physics, solid state physics, static and dynamic **In each field, students need at least 50%** of the mentioned credits. If one or more subjects have less than 50% of the needed credits, the application will be rejected. A student can have up to a **maximum of 20 missing credits in total** and still **will be accepted**. This means that if 20 credits are missing, a total of four additional modules must be taken during the Master's degree. This can extend the duration of the programme up to one or two semesters. If a student has more than 20 credits missing, the application will be rejected. To fulfil the above-mentioned requirements, we advise students to **take the missing modules at their home university in time** (best between the third to fifth Bachelor's semester).

Be aware that we can only accept your modules if they are successfully passed and certificated from the home university and handed in during the application period.

Please note that you can apply for this programme if you complete your Bachelor's degree before 1 October and have enough credits in all four areas by the end of the application period.

As a non-EU applicant, you have to successfully pass the Graduate Record Examination Test (GRE). Only **GRE general tests** will be accepted. In the quantitative part you need at least 160 points. Your official GRE report of scores must be received by the RWTH directly from the Educational Testing Service (ETS). The code number for RWTH Aachen is 8504. Please upload the test result directly in RWTHonline till **deadline 1 March**. Your test must **not be older than two years at the time of the application deadline.** More information regarding the Graduate Record Examination can be found on the ETS webpage.

Please note: To obtain a visa for Germany, you must currently make an appointment at the German Embassy at least six months in advance.

For further information or if you have any questions about the application, please contact us dekanat-bme@ukaachen.de.

Further details are listed in the examination regulations.

Language requirements

If you would like to study Biomedical Engineering, you need to prove proficiency in English. On the RWTH internet page you can find the newest binding requirements.

You can prove this by submitting only one of the following language test certificates:

- **TOEFL IBT** ("internet-based") – **minimum score: 100**
- **IELTS** (International English Language Testing System) –**minimum score: 7.0**
- **Cambridge Test:** English Certificate – **minimum: C1 Advanced** or **C2 Proficiency**
- **Pearson Test of English (PTE)** – **minimum score: 70**
- **UNIcert III** or higher
- Only for RWTH Bachelor students: **Placement Test** of the RWTH Language Centre – **minimum: C1.1.1** or higher

The certificate must **not be older than two years** prior to the start of the programme in October.

Exempt from the obligation to submit an English language test are applicants who have completely studied and received their Bachelor's degree in the following countries:

- Canada
- United States of America
- United Kingdom
- Ireland
- New Zealand
- Australia

Please note that we do not accept an English Bachelor's degree issued by a country where English is not the first language as proof of proficiency in the English language.

Please keep in mind that we do not accept language tests issued by individual institutions or universities.

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Submit application to	Applications for RWTH Aachen University**only online** Please click here for further information: RWTHonline.

Services

Possibility of finding part-time employment	At RWTH Aachen University, international students have very limited work opportunities while studying. Therefore, it is not possible to finance the entire studies through working alone. There are teaching and research assistant positions available at the involved institutes. These are, however, only awarded to students who have already started their academic studies in a programme. Students working as a teaching or research assistant may work a **maximum of 19 hours a week** but will usually not earn enough to cover all of their living expenses. By law, a student from outside the EU is permitted to work either 120 full days or 240 half days per calendar year. We do caution students to be careful about taking on outside work commitments, as completing a Master's degree within the designated two years will be difficult if a student spends too much time away from his or her studies.
Accommodation	RWTH Aachen University has a limited number of dorm rooms and studio apartments. However, there are usually waiting lists for these rooms, and students will probably need to find private accommodation first. There are a number of options for finding private accommodation in and around Aachen or just over the border to the Netherlands or Belgium. The International Office can provide students with information beforehand or upon arrival. The average rent per month for a**flat starts from 400 to 600 EUR** Please note that there is only a very limited number of family apartments in the university dorms, which is why students who bring their spouses or families with them will most likely need to find private accommodation. Rooms in **university dorms cost between 200 and 450 EUR**, depending on room size. For short-term accommodation, there are many hotels and a youth hostel. RWTH Aachen University also offers a housing guide for international degree and non-degree students: Accommodation in Aachen – RWTH AACHEN UNIVERSITY.
Career advisory service	Departmental Academic Adviser Mentoring programme RWTH Career Centre Bonding company contact fair in Aachen
Support for international students and doctoral candidates	• Welcome event • Buddy programme • Tutors • Accompanying programme • Cultural and linguistic preparation • Specialist counselling • Visa matters
General services and support for international students	• IDEA-League Research Grant • UNITECH International

and doctoral candidates	• MEDICA fair in Düsseldorf • RWTH Aachen University open day • Dean's list at RWTH Aachen University • Springorum Commemorative Coin from the support association of RWTH Aachen University • Graduate ceremony
Supervisor-student ratio	1/30

RWTH Aachen University

With 260 institutes in nine faculties RWTH Aachen is one of Europe's leading institutions for science and research. Currently more than 47,000 students are enrolled in 148 academic programmes. More than **14,000** of them are **international students from 138 countries.**

RWTH Aachen University is one of the eleven **excellent universities in Germany**. Visible evidence of this is the campus that is being developed in close cooperation with industry and which is to form one of the largest research parks in Europe - the **RWTH Aachen Campus**. Some research institutes, clinics and companies involved in this BME Master's programme are part of this new campus area.

National rankings and international assessments attest to RWTH graduates' strong ability to handle complex tasks, to solve problems constructively in teamwork and to take on leadership roles. Numerous board members of German corporations have studied at RWTH Aachen University.

A large part of this Master's programme takes place on the facilities of **UKA** (see image above), which is the university hospital of RWTH Aachen University.

It is one of the **largest hospital buildings in Europe,** located in the west of Aachen, in the immediate vicinity of the Netherlands and Belgium. Around 7,000 employees in 36 specialist clinics and 25 institutes (six of which have patient care responsibilities) provide care for a total of around 50,000 inpatients and 200,000 outpatients.

The architecturally and organisationally unique bundling of **medical care, research and teaching under one roof** enables intensive interdisciplinary exchange and close clinical and scientific networking.

University location

Aachen is the westernmost city of Germany in the border triangle to Belgium and the Netherlands. Its **population is 250,000**, and about

15% of them are students. Aachen's historic centre around the distinctive cathedral (UNESCO World Heritage Site) is characterised by a student lifestyle. Nearby is the hilly Eifel landscape with its river, lakes and forests offers a picturesque countryside for outdoor activities. The national park called "High Veen" on the Belgian border also delights with its unique flora and fauna.

Aachen also benefits from its central location in the **heart of Europe**. Berlin, Amsterdam, Paris, London and Brussels are not far away.

Contact

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Medical Faculty
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https://www.instagram.com/biomedicalengineering_rwth/

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