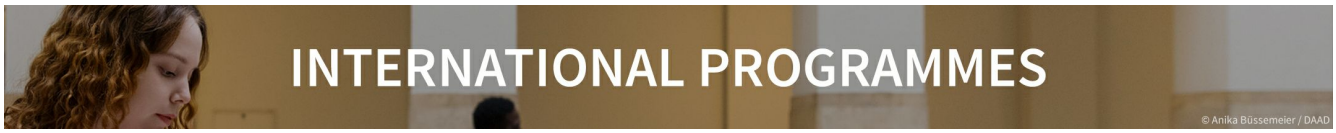
Deutscher Akademischer Austauschdienst
German Academic Exchange Service



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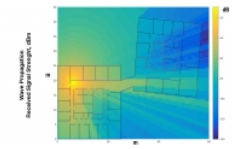
Master's degree

Communications Engineering – Master's Study Programme

RWTH Aachen University • Aachen

Overview

Degree	Master of Science in Electrical Engineering and Information Technology
Teaching language	• English
Languages	The degree programme is taught in English. If modules are taught in a different language, this is indicated in the corresponding module catalogue. Examinations are to be taken in English (or in agreement with the examiner in another language).
Full-time / part-time	• full-time
Mode of study	Fully on-site with voluntary online elements
Programme duration	4 semesters
Beginning	Winter and summer semester
Application deadline	Non-EU applicants: 1 March for the following winter semester EU applicants: 15 July for the following winter semester Non-EU applicants: 1 September for the following summer semester EU applicants: 15 January for the following summer semester
Tuition fees per semester in EUR	None
Combined Master's degree / PhD programme	No
Joint degree / double degree programme	No
Description/content	**IMPORTANT NOTICE:** Students interested in the Communications Engineering major **have to apply** for the Master's programme in "**Electrical Engineering and Information Technology**". Once accepted and enrolled, they can choose any one of the five majors.

The Communications Engineering (COMM) major offers a broad range of topics covering the field of communication and information technology at different levels of abstraction.

The system concept stands at the most abstract level: the parts and systems that are required for a specific communication task. For this, the necessary mathematical foundation will be laid. The architecture of the systems used, like transmitters, receivers or signal processors, will be covered in depth. The components of these will be discussed: digital signal processing including the VLSI implementation, analogue components like mixers, amplifiers and filters as well as antennas are all part of the Master's programme.

Naturally, since the entire field of Communications Engineering is too vast to cover in two semesters worth of lectures, only the general ideas and principles will be taught in the mandatory “CORE” courses, while the students can choose from a broad catalogue of “ELECTIVE” subjects, effectively deciding the field they want to focus on.

Core subjects are:

- Estimation and Detection Theory
- Mobile Radio Networks 1
- Principles and Design of Communication Systems and Networks
- RF Systems

The major COMM covers the whole range of communication: wireless communication, electromagnetic waves, optical communication and special forms such as radar or satellite navigation as well.
Since the programme covers ideas and concepts behind communication and information engineering rather than only one type of communication technology, students will be able to apply these to any current or future communication system. They will be able to develop complex systems via a hardware/software co-design methodology. Furthermore, they will have all of the necessary skills to perform the modelling, analysis, synthesis, and optimisation of such systems. This ensures optimal job security in the future.
On top of that, the institutes of the RWTH offer numerous research assistant positions. Many students enrolled in the Master's programme take the opportunity to gain hands-on experience and first-hand insight into current research projects conducted at the RWTH.

In brief – what to expect of COMM– everything about RF communication, ranging from audio up to mm-wave frequencies and beyond:

- Mathematical fundamentals: modulation, detection (reconstruction), wave propagation
- Communication mediums: electromagnetic, optical
- System level design: selection of required blocks and functions
- Receiver and transmitter design
- Digital circuit design: algorithm, DSP and VLSI design
- Analogue circuit design: power management, amplifiers, mixers, filters
- Signal processing basics: speech, video, data streams
- Others: radar, satellite navigation
- Many student assistant job opportunities

Course Details

Course organisation

The standard period of study is four full-time semesters (two years), including the preparation of the Master's thesis. The course of study may be commenced in either semester.

The programme consists of a range of mandatory or mandatory-elective modules that define the specific profile of the study programme.

This part of the curriculum is complemented by a**large offer oflaboratory work, project work, and seminars.** In addition, there is a selection of possible courses that comprise courses from all other Master's programmes offered by the faculty. Finally, there is an assortment of elective courses from the entire RWTH course programme, including courses in economics and soft skills as well as language courses. All Master's students must complete the "Scientific Integrity" module to meet ethical standards of scientific practice. German language courses are compulsory for all students

who cannot certify a German language level of at least B1.

During the 18-week **industrial internship**, students will learn how to solve current engineering problems while working with renowned industry partners. This is often the first step towards the student's future professional career.

The **Master's thesis** is an independent, predefined scientific project to be completed in a fixed period of six months. It is concluded by an oral presentation and defence of the results.

A total of 120 ECTS credits are required for the successful completion of the programme, distributed among the various subject areas. Modules from the CORE department are mandatory and must be taken for at least 20 credits.
Below you will find a visual structure of the Master's programme to see how many credit points are required in each subject area.

The programme utilises the following basic forms of teaching to achieve the defined goals:

- Lectures – a serial presentation of material, including specific methodologies
- Tutorials – solidifying and deepening expert knowledge and capabilities by solving problems associated with the lecture material
- Seminar work – the elaboration of complex questions and scientific knowledge (Students give oral presentations in the seminar.)
- Intensive courses – compact intensive courses composed of lectures and tutorials

Important additional options for gaining technical competence are available, such as:

- Semester and Master's projects completed in small groups or individually
- Excursions
- Practical (e.g. laboratory) work directly related to lectures
- A minimum of 18 weeks of industrial experience

View PDF Download below to find our module catalogues:

» PDF Download

A Diploma supplement will be issued	Yes
International elements	• Training in intercultural skills • International guest lecturers • Language training provided • Projects with partners in Germany and abroad • Specialist literature in other languages • Courses are led with foreign partners • International comparisons and thematic reference to the international context
Integrated internships	Students are required to complete an industrial internship for a minimum period of 18 weeks as an integrated and compulsory part of their curriculum. During the internship, students will be trained how to handle practical engineering problems. Flexibility and open-mindedness are major qualifications of an electrical engineer.
Special promotion / funding of the programme	• DAAD • Other (e.g. state level) • ERASMUS+ • Franco-German University (FGU)
Name of DAAD funding programme	KASP – King Abdullah Scholarship Programme; IAESTE – internships for foreign students of engineering; support programmes for students from various countries (for example Costa Rica, Argentina, Mexico, Colombia, Turkey, Paraguay, Tunisia)

Course-specific, integrated German language courses	Yes
Course-specific, integrated English language courses	No

Costs / Funding

Tuition fees per semester in EUR	None
Semester contribution	Approx. 300 EUR student services contribution per semester The fee includes a semester ticket covering public transport in all of North Rhine-Westphalia. The "Semesterticket" is now valid throughout Germany, as part of the official "Deutschlandticket". Consequently, it is possible to travel further into the Netherlands, as the entire South Limburg area is also included in the ticket.
Costs of living	The cost of living and studying, including food, accommodation, personal and social expenses, and study-related costs, is estimated to be 1,071 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 January 2024). Employment as a research assistant is possible. The salary for eight hours per week is about 487 EUR.
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: more information about the education fund. Additionally, there are a number of trusts and foundations that offer scholarships. A full list of programmes and foundations can be found in the RWTH Scholarships Database: more information about the scholarships and funding programmes.

Requirements / Registration

Academic admission requirements	1. In order to apply to the RWTH Master's programme in Electrical Engineering and Information Technology with a specialisation in Communications Engineering, applicants should have completed their basic studies (Bachelor of Science or Engineering or an equivalent academic degree) at an internationally recognised university. The basic study should fulfil both the subject requirements listed below and those listed in detail on the homepage of the Faculty of Electrical Engineering and Information Technology. More information about subject requirements • At least 28 ECTS credits for advanced mathematics • at least 10 ECTS credits for physics and physical principles of electronic devices • at least 34 ECTS credits for fundamentals of electrical engineering including circuit technology • at least 12 ECTS credits for informatics (computer science) and programming • at least 8 ECTS credits for fundamentals of control and mathematical systems theory • at least 8 ECTS credits for advanced electromagnetic field theory or theoretical information theory

- at least 20 ECTS credits for application-oriented courses

2. In addition, at the time of application, all applicants are obliged to prove that they have taken the Graduate Record Examination (GRE) General Test. The test score must fulfil the minimum requirements according to the current examination regulations. Applicants who are citizens of a member state of the European Union or the European Economic Area (EEA) as well as those with prior educational qualifications from Germany (so-called “Bildungsinländer”) are exempt from this rule.

3. Conditional admissions are possible. In this case, additional study requirements have to be fulfilled.

4. Admission to this Master's programme requires proof of adequate knowledge of the English language (see below).

Language requirements	Admission to this study programme requires proof of adequate knowledge of the English language (TOEFL-iBT 90, IELTS 5.5, or equivalent). International students who cannot provide proof of German language skills at level B1 or better (according to the CEFR) are obliged to take German language courses as part of their curriculum (equivalent to 8 ECTS credits). More information about language skills
Technical equipment and programmes	Devices: Laptop
Application deadline	Non-EU applicants: 1 March for the following winter semester EU applicants: 15 July for the following winter semester Non-EU applicants: 1 September for the following summer semester EU applicants: 15 January for the following summer semester
Submit application to	**Please note** that you have to apply for the Master's degree programme in "Electrical Engineering and Information Technology" and then choose the **Communications Engineering major**. Click here for the online application.

Services

Possibility of finding part-time employment	International students have very limited work opportunities while studying. Therefore, it is not possible to finance your 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, and the International Office can provide students with information beforehand or upon arrival.

	The average rent per month for a flat starts from 400 EUR 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 EUR and 500 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: more information about accommodation in Aachen.
Career advisory service	• Departmental academic adviser • Mentoring programme • RWTH Career Center • Bonding company contact fair in Aachen
Support for international students and doctoral candidates	• Welcome event • Buddy programme • Cultural and linguistic preparation
General services and support for international students and doctoral candidates	• IDEA League Research Grant • UNITECH International • Day of Electrical Engineering and Technology in Aachen • RWTH Aachen University open day • Dean's list at RWTH Aachen University • Friedrich-Wilhelm Price • Springorum Commemorative Coin from the support association of RWTH Aachen University • Graduation ceremony

Our Partners

JARA Jülich Aachen Research Alliance

Fraunhofer

RWTH Aachen University

Central part of RWTH Aachen University campus

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With 260 institutes in nine faculties, RWTH Aachen University is one of Europe's leading institutions for science and research. Currently, more than 45,284 students are enrolled in 173 academic programmes. More than 14,437 of them are international students hailing from 141 different countries. The scientific education students receive at RWTH Aachen University is firmly rooted in real-world application.

As a result, our graduates are highly sought after by businesses to work as trainees and fill executive positions. National and international rankings show that our graduates have a high aptitude for managing complex tasks, constructively solving problems in teams, and taking on leadership responsibilities. Thus, it should come as no surprise that one in five board members of German corporations is an alumnus of RWTH Aachen University. Work conducted in the research centres at RWTH Aachen University is strongly oriented towards the current needs of industry, commerce, and the professions. This has resulted in numerous innovations, patents, and licences. The individual competence centres at RWTH Aachen University collaborate effectively across departments and faculties in interdisciplinary groups and forums, while still maintaining a strong focus on their own department specialisation. For instance, the computer science and biology departments – and even the social sciences – all have a clear connection to the school's engineering focus. This has been a crucial factor in motivating multinational corporations such as Philips, Microsoft, and Ford to locate their research institutions in the Aachen region. Excellence in teaching and research constitutes the basis from which RWTH Aachen University works with other leading institutions and technical universities around the world. RWTH Aachen University is aware of its responsibility toward society and the environment and actively contributes to a sustainable higher education landscape.

University location

As Germany's westernmost city, Aachen is located on the borders of Belgium and the Netherlands. Its population is about 260,000. Aachen's historic centre around the distinctive cathedral (UNESCO world heritage site) is characterised by a student lifestyle. At the city's doorstep, the hilly Eifel landscape with its rivers, lakes, and forests offers a picturesque countryside for outdoor recreation. Aachen benefits from its central location in the heart of Europe!

Contact

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Faculty of Electrical Engineering and Information Technology

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