



Deutscher Akademischer Austauschdienst  
German Academic Exchange Service



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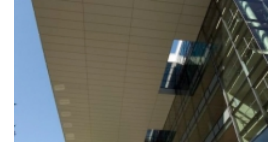
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# Master's degree



## Railway Systems Engineering

RWTH Aachen University • Aachen



## Overview

Degree	Master of Science
Course location	Aachen
Teaching language	<ul style="list-style-type: none"><li>English</li></ul>
Languages	The language of the programme is English. Participants can attend elective subjects taught in German.
Programme duration	4 semesters
Beginning	Winter and summer semester
Application deadline	EU/EEA applicants: 15 July for the following winter semester and 15 January for the following summer semester Non-EU/non-EEA applicants: 1 March for the following winter semester and 1 September 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	<p>How can innovative ideas in rail vehicle construction enable new transport concepts? How can transport networks be logically developed, expanded, relieved, and ecologically planned? How can factors like rolling stock and routing be managed in a way that need-oriented and smooth railway traffic is possible? How do random disturbances in transportation have to be considered in order to avoid jamming or to optimise safety strategies? How can we shift more passenger and freight transport to the rails? Is driverless operation possible for all kinds of rail transport means? When the interaction of technical possibilities, infrastructure, and human behaviour is supposed to be optimised, transport engineers are called upon for their interdisciplinary perspective.</p> <p>Students of the Railway Systems Engineering programme acquire this interdisciplinary expertise by studying the perspectives of three engineering disciplines: civil engineering, mechanical</p>

engineering, and electrical engineering. The specialisation Railway Systems Engineering (RSE) concentrates on the further development of railway engineering. Students work with rail vehicles, rail transportation systems, and infrastructure developments in rail transportation. This Master's programme covers each aspect of the complete system of "railway": the infrastructure, operation, and vehicles, including the electrical drive as well as electric power supply. Furthermore, this is the only specialisation of the Master's degree programme in Transport Engineering and Mobility that can be studied completely in English.

### Course objectives and future opportunities

The objective of this specialisation is to train and educate engineers with multidisciplinary expertise that can take the challenges of the modern railway sector head on. The future possibilities for railways, the eldest of the modern transport means, are the brightest among all others. Railways remain ecologically superior, even as modern high-speed trains compete successfully with short and medium distance aeroplanes. The growing number of megacities all around the world would be in chaos without metros, LRVs, and trams. Furthermore, without freight transport on rails, our highways would be even more congested than they are today.

Seemingly modern technologies like electric mobility have been state of the art in railways for more than 100 years. Driverless operation has already been implemented in more than 60 metro and people mover systems around the world. But there is still need for innovation. Digitalisation is the key word, implying driverless operation for all types of railways, energy optimised driving with zero emission, automated condition based monitoring and predictive maintenance, better use of the track capacities, etc.

Railway systems engineers can work for rolling stock manufacturers as well as for their consultants and suppliers. Their expertise is required by the operators as well as by the infrastructure managers. Consequently, along with the engineering companies in the private sector, the opportunities in the public sector are open to them as well.

Finally, no matter where a railway systems engineer works, the diverse tasks at hand are guaranteed to be interesting, challenging, and rewarding.

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## Course Details

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### Course organisation

The faculties of Civil Engineering, Mechanical Engineering, Electrical Engineering and the School of Business and Economics have established an interdisciplinary study programme on the field of transportation called **Transport Engineering and Mobility**.

The Master's programme is offered in five specialisations, covering all kinds of transportation. The **Railway Systems Engineering (RSE)** Master's programme is offered in German ("Bahnsystemingenieurwesen") as well as in English.

The RSE Master's programme is organised by the Research Center Railways, a cooperation between three institutes from the three different engineering faculties mentioned above. These are:

**Institute of Transportation Science and Chair of Railway Engineering and Transport Economics (VIA)**

See: <http://www.via.rwth-aachen.de>

**Chair and Institute of Rail Vehicles and Transport Systems (IFS)**

See: <https://www.maschinenbau.rwth-aachen.de/go/id/xkw/lidx/1>

**Chair and Institute for Power Electronics and Electrical Drives (ISEA)**

See: <https://www.isea.rwth-aachen.de/>

### Exemplary study plan

First semester:

- Railway Systems
- Principles of Rail Vehicle Technology
- Power Electronics - Fundamentals, Topologies and Analysis

- Environmental Sustainability in Transport Engineering
- Energy Storage Systems

Second semester:

- Railway Control Systems
- Sustainability Strategies in Policy and Companies
- Mechatronic Systems in Vehicle Engineering
- Advanced Electrical Drives
- Mobility Research and Transportation Modelling
- Power Electronics – Control, Synthesis and Applications

Third semester:

- Track Guiding Technology
- Railway Capacity Management and Operations
- Railway Operations Lab
- Advanced Electrical Drives
- Internship of eight to sixteen weeks

Fourth semester:

- Master's thesis
- Multibody Dynamics

<b>A Diploma supplement will be issued</b>	Yes
<b>International elements</b>	<ul style="list-style-type: none"> <li>• Language training provided</li> <li>• Projects with partners in Germany and abroad</li> <li>• International comparisons and thematic reference to the international context</li> </ul>
<b>Integrated internships</b>	An internship is integrated into the Master's degree programme. This internship should take place at a railway-specific company or research institution and should encompass typical engineering tasks. After successful completion of the internship, students will be awarded up to 20 ECTS credit points.
<b>Course-specific, integrated German language courses</b>	No
<b>Course-specific, integrated English language courses</b>	No

## Costs / Funding

<b>Tuition fees per semester in EUR</b>	None
<b>Semester contribution</b>	All RWTH students must pay a social contribution to student services amounting to approx. 318 EUR per semester. This is not a tuition fee. Please visit our website for further information on how the fee is spent: <a href="http://www.rwth-aachen.de/re-enrollment/?lidx=1">http://www.rwth-aachen.de/re-enrollment/?lidx=1</a>
<b>Costs of living</b>	The cost of living is approximately 1,132 EUR per month (including the social contribution fee for each semester).

**Funding opportunities within the university**

Yes

**Description of the above-mentioned funding opportunities within the university**

RWTH offers a variety of scholarships. Please find more information online: <http://www.rwth-aachen.de/go/id/dyiv/lidx/1>.

## Requirements / Registration

**Academic admission requirements**

Academic admission requirements include a first university degree that proves the necessary engineering background education as outlined in the exam regulations.

Applicants should have completed 18 ECTS in mathematics/statistics (at least 14 ECTS in mathematics and 2 ECTS in statistics), 11 ECTS in mechanics, and 5 ECTS in the field of basic electrical engineering. Furthermore, they have to prove knowledge equivalent to at least 10 ECTS in at least two of the following topics: building material science/material science, automatic control, hydromechanics/fluid mechanics/thermodynamics, physics.

Subject-specific knowledge equating to 40 ECTS is required. From this subject-specific knowledge, at least 10 ECTS must have been acquired in two of the following fields: transportation science, mechanical engineering, or electrical engineering. This knowledge must be comparable with what is taught in the RWTH Bachelor's programme in Transport Engineering and Mobility.

The examination board may admit a student to a Master's degree programme on the condition he or she obtains additional qualifications. Evidence of the completion of such additional requirements must be provided before registering for the Master's thesis.

Admission to the Master's programme is not possible if your additional requirements exceed the CP (credit points) listed below:

- mathematical-statistic basics: 8 CP
- basics in mechanics: 9 CP
- further engineering basics: 8 CP
- subject-related basics: 15 CP
- or total scope of additional requirements: 30 CP.

In addition, proof of the Graduate Record Examination (GRE) General Test is required. Applicants who are nationals of a member state of the European Union or of the European Economic Area (EEA) are exempt from this requirement.

**Language requirements**

In addition to the subject-related prerequisites, applicants must show proof of a profound level of the English language, at least equivalent to B2 level of the Common European Framework of Reference for Languages (CEFR).

The following language tests are accepted as proof of English language skills:

- Test of English as Foreign Language/TOEFL, Internet-based test iBT, with at least 90 points
- International English Language Testing System, IELTS, with a grade of at least 5.5
- Certificate of Advanced English CAE
- First Certificate in English FCE, with a grade of at least B
- Any official certificate that certifies English language skills at level B2 of the Common European Framework of Reference for Languages, CEFR
- Placement test of the RWTH Aachen Language Center at the B2 level (This language certificate can only be obtained by individuals who are already enrolled as students at RWTH Aachen.)

**Application deadline**

EU/EEA applicants: 15 July for the following winter semester and 15 January for the following

summer semester

Non-EU/non-EEA applicants: 1 March for the following winter semester and 1 September for the following summer semester

**Submit application to**

Please submit your application online: <http://www.rwth-aachen.de/go/id/dqml/lidx/1/>.

## Services

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**Possibility of finding part-time employment**

International students may take up work in the private sector during the semester or the semester break for up to three months without having obtained a work permit. Students thus may take up full-time work for 120 days or part-time positions for 240 days. This regulation is also stated on the residence permit. During the semester, students are allowed to take up jobs with working hours of up to 20 hours a week. Student assistants are more flexible as regards working hours.

**Accommodation**

University accommodation in Aachen is limited. Therefore, participation in individual allocation procedures is usually required. Because of the demand for university accommodation, it can be necessary to switch to the private accommodation market. Family and couples apartments are in especially high demand. Therefore, it is likely that students who require this kind of accommodation must seek accommodation on the private market. The majority of RWTH Aachen University's students are committed to the private accommodation market. There are a number of options for finding private accommodation in and around Aachen. The International Office can provide students with information beforehand or upon their arrival. Prices for university accommodation vary between 200 EUR and 330 EUR per month. Accommodation on the private market is priced between 290 EUR and 550 EUR per month, depending on the size and the number of rooms. For short-term accommodation, there are many hotels, a few youth hostels, and a boardinghouse located in and around Aachen (reservation is recommended). Please visit <https://www.rwth-aachen.de/housing> for further information.

**Career advisory service**

The RWTH Aachen University Career Center offers support by providing opportunities that strengthen your professionalism and exercise your individual skills in the application process. All enrolled RWTH Aachen University students can participate in the seminars at the Career Center. Please find more information online: <https://www.rwth-aachen.de/go/id/sff/?lidx=1>.

**Support for international students and doctoral candidates**

- Welcome event
- Buddy programme
- Cultural and linguistic preparation
- Visa matters



## Civil Engineering RWTH Aachen University – All About Transportation

This is the official YouTube channel of the Open Educational Resource Initiative of the Faculty of Civil Engineering at RWTH Aachen University. This channel offers a variety of videos showing the many facets of basic and current research in the area of civil engineering.

» more:

<https://www.youtube.com/watch?v=vkzgcJGdUnA&list=PLxQWK4LR7JyMLcOZhyBdxbwW4Mbm11Ce4>

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# RWTH Aachen University

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RWTH Aachen main building

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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 47,000 students are enrolled in 173 academic programmes. More than 14,150 of them are international students hailing from 138 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.



## 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 Civil Engineering

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✉ [support@fb3.rwth-aachen.de](mailto:support@fb3.rwth-aachen.de)

🌐 Course website: <https://www.rse.rwth-aachen.de/index.html>

● <https://twitter.com/RWTH>

📷 <https://www.instagram.com/rwthaachenuniversity/?hl=de>

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# International Programmes in Germany - Database

[www.daad.de/international-programmes](http://www.daad.de/international-programmes)  
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## Editor

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Consortium for International Higher Education Marketing  
[www.gate-germany.de](http://www.gate-germany.de)

## Disclaimer

The data used for this database was collected and analysed in good faith and with due diligence. The DAAD and the Content5 AG accept no liability for the correctness of the data contained in the "International Programmes in Germany" and "Language and Short Courses in Germany".

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