DAAD

Deutscher Akademischer Austauschdienst
German Academic Exchange Service

INTERNATIONAL PROGRAMMES

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Master's degree

Autonomous Systems (MSc)

Hochschule Bonn-Rhein-Sieg • Sankt Augustin

Overview

Degree	Master of Science
In cooperation with	Bonn-Aachen International Center for Information Technology (b-it) and Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS)
Teaching language	• English
Languages	The courses are taught entirely in English.
Programme duration	4 semesters
Beginning	Winter and summer semester
Additional information on beginning, duration and mode of study	The programme spans four semesters (two years), during which a total of 120 ECTS (European Credit Transfer System) points will be earned. Individual mentoring characterises the programme, guiding students through independent scientific work and fostering interdisciplinary cooperation in research and development projects.
Application deadline	There are two semesters per year, **winter semester** (starts the first week of September) and **summer semester** (starts the first week of March). The application windows for both semesters open the year before the semester starts: for the winter semester (WS), it opens on 15 November, and for the summer semester (SS), it opens on 15 May. The deadlines are as follows: For international students **requiring a visa** to study in Germany: • winter semester: 15 January of the same year in which the semester starts • summer semester: 15 July of the year before the semester starts For students who **do not require a visa** to study in Germany (e.g. because they already hold a residency permit in Germany or are EU citizens): • winter semester: 15 August of the same year in which the semester starts • summer semester: 15 February of the same year in which the semester starts

Tuition fees per semester in EUR	None
Combined Master's degree / PhD programme	No
Joint degree / double degree programme	No
Description/content	The primary objective of the Autonomous Systems degree programme is to provide students with the knowledge and skills they need to advance the design, realisation, and robust deployment of robot systems for everyday applications. More recently, robots are moving closer to humans and collaborating with them in shared spaces to achieve shared goals. This necessitates a novel, human-centred perspective that complements traditional robot autonomy with a focus on human empowerment through enhanced safety, trustworthiness and transparency. Students achieve this by performing and applying cutting-edge research in robotics, artificial intelligence, machine learning and computer science. The four-semester programme challenges talented, motivated and dedicated students and involves coursework as well as project work. Our excellent lab infrastructure and robots are used in course work, practical courses, seminars and project work. They complement our lectures, which encourage student participation and engagement through innovative, interactive teaching-learning methods. The students in the programme form the b-it-bots team which is active in both the RoboCup @Home and @Work leagues and has won the national as well as international world championship title a number of times. They have also regularly and successfully participated in a variety of other competitions around Europe. A large portion of the programme involves R&D project work. Our affiliation with the Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS), one of the leading research institutes in Germany in the fields of AI, machine learning and big data as well as our scientific collaboration with other institutes of the Fraunhofer Society, the largest organisation for applied research in Europe, provides an unparalleled opportunity for students to pursue extensive practical training in cutting-edge projects. These may also be conducted in publicly-funded research projects at H-BRS (e.g. Garrulus, Center for Assistive Technologies Rhein-Ruhr, and Data Competency Center Rhein-Ruhr). This ensures high-quality, research-oriented education in the field, and it offers problem-oriented training in soft skills. Students may also conduct their projects at research institutes and industrial entities such as Fraunhofer IAIS, IPA, FKIE and SCAI, DFKI Bremen, KELO Robotics, NEURA Robotics, Capgemini and measX. Presentations by leading international guest speakers are scheduled regularly, and they help to further expose students to the state of the art in a wide variety of robotics-related fields. The international programme in Autonomous Systems admitted its first students in 2002 and with well over 20 years of experience, continues to offer multifaceted training in the fields of AI and robotics, spanning a whole range of topics involved in the field. These include but are not limited to autonomous agents, cognitive systems, robot control architectures, mobile manipulation, compliant control, autonomous navigation and control of mobile robots, machine learning, computer vision, natural language processing, human-centred AI, human-robot interaction and collaboration, multi-modal robot perception, fault tolerance, automated planning, AI reasoning, and robot ethics. This has led to the founding of the Institute for Artificial Intelligence and Autonomous Systems (A2S) in 2023.

Course Details

Course organisation	Students take a number of core courses in the first semester as well as compulsory seminars and practical courses throughout their studies. The second and third semesters contain both coursework and project work. About half of the ECTS points are awarded to the R&D project and accompanying research-oriented seminars from the second semester. The project is presented and documented in a report by each student. The other half of the ECTS points are awarded for

coursework.

In the fourth semester, students research and write their Master's theses. A final defence of the thesis completes the 120-credit requirement. A more detailed view of the modules can be found in the module matrix.

The programme is fully accredited by ASIIN, the German accreditation agency for study programmes in engineering, informatics, and natural sciences. ASIIN is a member of the Washington Accord for the international recognition of accredited degree programmes and, as such, the accreditation of the programme is recognised worldwide.

A Diploma supplement will be issued	Yes
International elements	- International guest lecturers - Language training provided - Projects with partners in Germany and abroad - Integrated/optional study abroad unit(s)
Integrated/optional study abroad unit(s)	Study abroad is possible and encouraged for the duration of one or two semesters. This requires prior application to, coordination with, and permission from the Examination Committee. For the Master of Autonomous Systems programme, we have double degree programmes with the University of New Brunswick (Canada) and the German Jordanian University (Jordan). Further information is available upon request.
Integrated internships	The Master's degree in Autonomous Systems is a "Master's by Research", which means that half of all credits are earned in research internships, either within the university or at research partners such as Fraunhofer IAIS. Students spend around 50% of their time in the second and third semesters on an R&D project and all of their time in the fourth semester on the Master's thesis project.
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	Each semester, contribution fees of around 300 EUR are due. These fees are mandatory and include a student administration office fee, a student union fee, and a public transport fee that allows for free use of the public transport system in the Bonn metropolitan area and the entire state of North Rhine-Westphalia. Please check our homepage for the exact amount, as it varies slightly from one semester to another.
Costs of living	Living expenses for university students in Germany will be about 850–1,000 EUR per month. This includes accommodation/rent (student dormitory), meals, medical insurance, social welfare, registration fee, transport, books, stationary, and so on.

Funding opportunities within the university	No

Requirements / Registration

Academic admission requirements

The programme accommodates a maximum of 25 admitted candidates per semester, thus guaranteeing an exclusive and high-quality education. An extraordinary level of commitment, proactivity, self-discipline and the ability to work well under pressure are expected of candidates.

For admission to the programme, a professional academic degree (Bachelor's or equivalent) is required in the areas of computer science, mathematics, natural sciences or engineering. The application should demonstrate sufficient knowledge of concepts, methods and tools in the field of computer science. Such knowledge is usually acquired in a four-year computer science course with at least 65% computer science content. Applicants who have already graduated from a first-level degree course of study in mathematical/scientific subjects or engineering can be admitted to the programme provided that the first-level degree course of study had a computer science content of, as a rule, at least 50%. They may also have to perform additional assignments, to be specified on an individual basis, worth up to 12 ECTS credits. Admission is based solely on credentials and academic excellence.

For your application to be reviewed by our admissions committee, a grade point average (GPA) of 2.5 or better on the German grading scale (1=excellent to 5=fail) is necessary. Grades from other countries are converted to the German equivalent by applying the "Bavarian formula". You can check if your GPA meets this criterion by performing the conversion yourself:

NMax is maximum possible grade of your university's grading system.
NMin is lowest passing grade of your university's grading system.
Nd is your GPA which needs to be mapped to the German grading scale.

Your German-equivalent GPA = $1 + (3*[(Nmax-Nd)/(NMax - NMin)])$.

For example, if NMax = 100, NMin = 60 and Nd = 78.2, then the equivalent score on the German scale is equal to $1 + (3 \times [(100 - 78.2)/(100 - 60)])$ which evaluates to 2.635. As the GPA in this example is greater than 2.5, it would not meet the given criterion.

Language requirements

The TOEFL, IELTS, or Cambridge Certificate for English language proficiency is required for all candidates who meet any of the following criteria:

- Candidates who do not have English as the de facto language in their country (i.e. countries other than Australia, Bahamas, Canada, New Zealand, UK, and USA)
- Citizens of Australia, Bahamas, Canada, New Zealand, UK, and USA whose first language is not English (i.e. those who have lived in countries other than those mentioned here and who have not obtained a school diploma that conforms to one of the national certificates of these countries – e.g. high school diploma, IB diploma, A-levels, and so on).

Exemptions are granted to applicants who meet any of the following criteria:

- Candidates who have earned a Bachelor's degree from universities in Australia, the Bahamas, Canada, New Zealand, UK, and US
- Candidates who have earned degrees from English-language degree programmes in Germany/EU

The minimum required language skill level is **upper B2** according to the Common European Framework of Reference for Languages. This currently corresponds to a TOEFL score of 79 or higher for the Internet-based test and to an **IELTS score of 6.5**. Scores must be submitted from a test taken within the last 24 months. The TOEFL code for the university is 7977 ("Fachhochschule Bonn-Rhein-Sieg").

No proficiency in the German language is required.

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Submit application to	https://www.h-brs.de/en/inf/application-mas-program

Services

Possibility of finding part-time employment	The university's Department of Computer Science offers research and teaching assistantships. Usually, these are available only after the first semester has been successfully completed. Further information is available upon request. Many companies in the vicinity of Sankt Augustin, Bonn, and Cologne also offer student jobs. However, please be advised that student visas restrict the number of hours that a student may work.
Accommodation	Student accommodation is available both in Sankt Augustin and in the nearby city of Bonn. Waiting lists exist for some student accommodation facilities, but foreign students are given priority. Students are urged to apply as early as possible. In addition, it is possible to rent a room or apartment on the private market.
Career advisory service	Offered by the university's career counselling service
Support for international students and doctoral candidates	• Buddy programme • Welcome event • Tutors
General services and support for international students and doctoral candidates	Admitted students receive a welcome pack, which includes information on the programme, the university, and the region as well as guidance for a smooth move to Germany. The study buddy initiative pairs volunteers from the programme's student body with incoming candidates. They also offer their help and advice in finding accommodation, answering questions about the programme, and so on. The university's International Office provides assistance in all matters concerning immigration and/or local authorities. The orientation course, which includes an intensive German language course, helps prepare students for the lectures and allows them time to settle in and get acquainted with their new surroundings. The welcome event at the start of lectures introduces them to the faculty and staff. Once enrolled, students receive guidance and counselling from their faculty advisers (mentoring programme).

Santosh Thoduka
MSc

The programme allowed me to focus on my interests: the software & intelligence aspects of robotics. The emphasis on research, especially the R&D and thesis, prepared me for PhD work after graduating. Being a member of the b-it-bots team provided hands-on experience with real-world robotics challenges, which I consider to be the most enriching aspect of my education. The friendly, international atmosphere of the programme & university further reinforce my strong recommendation for this programme.

Our Partners

The Master's Programme in Autonomous Systems: a Brief Overview

A short film about the Master's programme in Autonomous Systems (MAS) at the Hochschule Bonn-Rhein-Sieg University of Applied Sciences

» more: https://youtu.be/lZaZ-f1kFl8

Hochschule Bonn-Rhein-Sieg

Main building of Hochschule Bonn-Rhein-Sieg

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The Hochschule Bonn-Rhein-Sieg University of Applied Sciences (H-BRS) was founded in 1995. It is a dynamic and research-driven university with around 9,000 students, approx. 150 professors, and 260 research associates. They are supported by around 400 highly qualified lecturers from the fields of academia, business, and industry. An additional 200 employees work for the administration, the library and the language centre.

The university campuses are located in Hennef, Rheinbach, and Sankt Augustin. In Bonn, the Hochschule Bonn-Rhein-Sieg runs the Bonn-Aachen International Center for Information Technology (b-it) jointly with the Universities of Bonn and Aachen (RWTH).

The Master's programme in Autonomous Systems is offered by the Applied Sciences Institute (AS) of the Bonn-Aachen International Center for Information Technology (b-it). b-it AS was established through collaboration between the Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS) and the Department of Computer Science at Hochschule Bonn-Rhein Sieg (H-BRS), both located near Sankt Augustin, close to Bonn. The b-it institute, which includes b-it AS, was founded through cooperation among four prestigious universities and research institutions: the University of Bonn, RWTH Aachen University, Hochschule Bonn Rhein-Sieg, and the Fraunhofer-Gesellschaft.

The Department of Computer Science presents a youthful and modern front, just like the whole of the university. The technical equipment, our teaching professors, and research staff meet very high standards. The overall infrastructure of our young university is the best basis for successful completion of your study programme.

A top place in the Germany-wide academic "CHE Ranking" for our department reflects the individual mentoring of our students, the good IT infrastructure, and the excellent overall study conditions.

First-class teaching is linked to internationally successful research projects. In all of our courses both teaching and research are closely connected. In this way, students not only profit from the know-how and expertise of our professors and their various research projects but can also actively participate in them.

Our areas of focus are applied R&D, technology transfer, and an international and interdisciplinary approach. Thus, there is an emphasis on internships and practical applications in industry and research and joint research projects with numerous companies (many of them global players). H-BRS has official cooperation agreements with over 80 universities throughout the world.

The university is certified as a family-friendly university. We help students and employees to reconcile their study, academia, and family commitments by offering family-friendly measures to students and employees alike. The number of female professors and research associates working for the H-BRS is above average; our manifold measures are also aimed at making the study of technical subjects more attractive to female students.

University location

The Bonn-Rhein-Sieg region is a dynamic and internationally-oriented location for science, research, industry, trade, and the service industries. Sankt Augustin is located at the outskirts of the city of Bonn, and it has the character of a suburb of a major international city. With its 320,000 inhabitants, Bonn provides great cultural offerings and is consistently ranked among the top ten cities in Germany in terms of quality of life.

The region has an international background due to the heritage of Bonn's former status as capital of West Germany. Thanks to its perfect infrastructure, the city has developed into a centre for international cooperation. Numerous UN and non-governmental organisations have settled here in this cosmopolitan city on the Rhine. Bonn's economic and scientific institutions are also well known around the world.

In addition, the surrounding area of the Hochschule Bonn-Rhein-Sieg offers a beautiful countryside, an interesting range of cultural activities, and a diversity of leisure amenities ensuring a high quality of life. For this reason, it attracts millions of visitors every year. They visit Beethoven's birthplace, savour the theatre performances with productions by contemporary European dramatists at the Bonn Biennial, and enjoy the concerts held during the Beethoven Festival.
The delightful landscape of the Seven Hills, with the Dragon's Rock overlooking the romantic Rhine, has been a favourite with travellers since the 19th century. Hikers and cyclists will find a wealth of places to visit in the Eifel foothills.

The campuses are only a few minutes' walk from a suburban rail link or high-speed tram, which provides a fast and direct service to Bonn. The university's proximity to railways and motorways means that cities like Cologne and Düsseldorf are only a stone's throw away. Brussels is an hour and a half by train from Cologne, and Paris and Amsterdam can be reached in less than four hours! The Cologne-Bonn airport connects the region to the whole world.

Contact

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🌐 Course website: https://www.h-brs.de/en/inf/studienangebot/master/autonomous-systems

f https://www.facebook.com/hsbrs

● https://twitter.com/h_bonnrheinsieg

in https://de.linkedin.com/school/hochschule-bonn-rhein-sieg/

◉ https://www.instagram.com/hs_bonnrheinsieg/

▶ https://www.youtube.com/c/bitAutonomousSystemsGroup

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