



Deutscher Akademischer Austauschdienst
German Academic Exchange Service



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Master's degree



Master of Science in Communications and Signal Processing

Technische Universität Ilmenau • Ilmenau



Overview

Degree	Master of Science in Communications and Signal Processing
Teaching language	<ul style="list-style-type: none">English
Languages	Courses are held in English (100%).
Mode of study	Fully on-site with voluntary online elements
Programme duration	4 semesters
Beginning	Winter semester
Application deadline	<p>Application period for students with certificates from non-EEA / international countries: 16 January – 15 May</p> <p>Application period for students with certificates from EEA countries, Switzerland, or the UK: 16 April – 15 September</p> <p>Foreign applicants who need to apply for a visa to enter Germany should submit their application at least three months before the application deadline.</p>
Tuition fees per semester in EUR	None
Combined Master's degree / PhD programme	No
Joint degree / double degree programme	No
Description/content	<p>This international research-oriented graduate programme at TU Ilmenau is an excellent preparation for research and development positions in international companies and post-graduate studies. It is a unique AI (artificial intelligence) engineering programme with domain knowledge in communications and signal processing. It can be studied online or on-site.</p> <p>The study programme focuses on communications and signal processing with an emphasis on the following fundamental concepts:</p>

- information theory, coding, modulation
- optimisation techniques, compressed sensing
- tensor-based signal processing, multi-modal data fusion
- machine learning, data analytics
- parameter estimation, array signal processing, adaptive filters

It also focuses on the following applications:

- future wireless systems, channel modelling, antenna design
- connected / autonomous vehicles, radars / sonar
- audio coding, hearing aids, multimedia systems, wearable technologies, modern entertainment
- biomedical signal processing, brain / computer interfaces, better and safer medical scans, biometric security
- big data, stock valuation and prediction

This leads to rewarding career opportunities.

The first semester starts in October (every winter semester).

This programme has a strong focus on cutting-edge research. The courses provide a detailed insight into modern communication technologies from the physical layer to the application layer. Challenging problems in radio propagation, hardware and algorithm design, protocols and applications are addressed in class as well as in assignments and research projects.

Within the research projects, students work closely with the advising professors and research assistants. Accurate planning and implementation of teamwork is of particular interest. A literature review based on current publications for the subtasks and a detailed milestone plan for the project improve the students' skills in functioning successfully in projects. Students learn to present their research results. An evaluation and documentation of the results in the form of a scientific publication complete the project. Every year, successful students have the opportunity to present their results at leading international conferences and publish them in highest impact journals.

MSCSP on YouTube: <https://youtu.be/wqtozZSpoZ8>

TU Ilmenau on YouTube: <https://youtu.be/UIDUHVZVlgA>

MSCSP website: <https://www.tu-ilmenau.de/ei-ms-csp/>

Course Details

Course organisation

First semester:

- Advanced Digital Signal Processing
- Information Theory and Coding
- Microwave Engineering
- Communication Networks
- Communications Engineering

Second semester:

- Advanced Mobile Communication Networks
- Mobile Communications
- Antenna Engineering
- Research project
- Non-technical elective course(s) (key competencies)
- Technical elective course(s) (advanced studies)

Elective courses (held in the second semester):

- Multirate Signal Processing
- Video Coding

- Deep Learning
- Multimedia Standards
- Applications and Signal Processing Methods of Radar Technology

Third semester:

- Adaptive and Array Signal Processing
- Technical elective course(s)
- Non-technical elective course(s) (key competencies)

Elective courses (held in the third semester):

- Systems Optimisation
- Cellular Communication Systems
- Audio Coding
- Measurements in Communications
- Advanced research project
- Radio Standards
- Deep Learning
- Fundamentals and Systems of Radar Technology

Fourth semester:

- Master's thesis

Non-technical elective courses (five credit points [CP] during semesters one through three):

- Language courses, for example

A Diploma supplement will be issued	Yes
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	Approx. 150 EUR per semester (including a train ticket and reduced prices in the university canteen and cafeterias)
Costs of living	Approx. 860 EUR per month (including apartment rent)
Funding opportunities within the university	Yes

Description of the above-mentioned funding opportunities within the university

Students at TU Ilmenau do not pay tuition fees; instead, they only need to pay the semester contribution of approximately 150 EUR per semester.

Further information on funding opportunities is available at: <https://www.tu-ilmenau.de/en/international/service/we4you-student-service/funding-opportunities>

Requirements / Registration

Academic admission requirements

Bachelor's degree (at least six semesters / 180 CP) in one of the following disciplines:

- electrical engineering
- information technology
- media technology
- or similar courses

Basic knowledge in the following subjects is required:

- information theory and communications engineering
- digital signal processing
- signal and system theory
- telecommunications and networks
- linear algebra
- random processes, stochastics

Basic programming skills (Matlab/Octave or Python):

- variables, basic operators, conditional statements, loops, arrays, functions, etc.

One semester abroad is recommended for applicants with German as a native language.

Language requirements

Applicants must provide proof of their English skills. Good English skills (C1) are required to follow the lectures. The accepted certificates and levels are listed here:

<https://www.tu-ilmenau.de/language-certificates>

All applicants should provide one of the certificates, even if their Bachelor's studies were conducted in English.

Application deadline

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Application period for students with certificates from EEA countries, Switzerland, or the UK: 16 April – 15 September

Foreign applicants who need to apply for a visa to enter Germany should submit their application at least three months before the application deadline.

Submit application to

Online application: <https://www.tu-ilmenau.de/apply>

Services

Possibility of finding part-time employment

Temporary jobs are available at local enterprises. In some departments of TU Ilmenau, Master's students are regularly employed as scientific assistants.

Accommodation

Various student residences are available on campus. The rent in the residences is between 250 EUR – 350 EUR per room and month, depending on the type of residence. Registration is required in

advance at the administering office of the "Studierendenwerk Thüringen".

Information on the residences and registration can be found at:<https://www.stw-thueringen.de/en/housing/>

Student applicants have a good chance of getting a room if the application for a room is submitted in good time, approx. three months before the start of the semester.

Of course, there is also the option to look for a privately rented apartment/room in Ilmenau or the surrounding area. For further information on privately rented accommodation, please contact TU Ilmenau's international student service, we4you: <https://www.tu-ilmenau.de/en/international/service/we4you-student-service/team>

Career advisory service

TU Ilmenau's we4you career counselling service provides assistance to international students, enabling an easier transition from the classroom to the working world.

Through individualised career counselling, workshops on CV writing, and interview practice, we give students the tools they need to succeed in today's job market. Opportunities for internships and part-time or graduate jobs are further bolstered by our industry network and accessible job portal. Visits to local and nationwide job fairs are also on the agenda. These activities and events seek to equip students with the tools to confidently pursue their professional aspirations in the region surrounding the university, in Germany, and beyond.

For more information, visit: <https://www.tu-ilmenau.de/en/international/service/we4you-student-service/career-counseling>

Support for international students and doctoral candidates

- Welcome event
- Buddy programme
- Tutors
- Specialist counselling
- Visa matters
- Help with finding accommodation
- Support with registration procedures
- Accompanying programme
- Cultural and linguistic preparation

General services and support for international students and doctoral candidates

TU Ilmenau offers an international student service called we4you, aimed at supporting prospective and current students during the application and arrival process, everyday student life, and beyond. The we4you team provides advice, organises events and excursions, and helps students feel comfortable in Ilmenau.

For online and on-site we4you support, please visit: <https://www.tu-ilmenau.de/en/international/service/we4you-student-service>



Campus of the Technische Universität Ilmenau

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Technische Universität Ilmenau is public university with a strong focus on research. Located in the centre of Germany, it has a long tradition in engineering and natural sciences, making it a sought-after destination for interdisciplinary research and education. With five faculties dedicated to delivering cutting-edge and sustainability-oriented programmes, the university offers 19 Bachelor's degree programmes, 25 Master's degree programmes, and doctoral education designed for real-world impact. Interested students can apply for a programme in the fields of engineering (e.g. Biomedical Engineering, Automotive Engineering, Mechanical Engineering), technology (e.g. Computer Science, Micro and Nanotechnologies, Renewable Energy Technology), mathematics (e.g. Business Mathematics), natural sciences (e.g. Biotechnical Chemistry, Technical Physics), or economic and social sciences (e.g. Media and Communication Science, International Business Economics). Many of the university's programmes are taught in English, and the large number of registered patents per staff provides just one example of the university's many innovation activities. Students at Technische Universität Ilmenau enjoy a great supervision ratio, access to excellent facilities conducive to research-driven learning (including modern labs and makerspaces), and career counselling and events to support global professional connections. The we4you international student service assists students in integrating into the university's vibrant campus community, which comprises over 100 nationalities. Through its extensive national and international partnership network and mobility options, Technische Universität Ilmenau fosters the expertise and personal development of its students and staff.



University location

Ilmenau is a vibrant hub of innovation and enterprise, where tradition intertwines with a strong focus on the future. The university town with its approximately 40,000 residents is situated in the centre of Germany in the federal state of Thuringia. Thuringia is known for its rich cultural heritage, with influential historic figures such as Goethe, Bach, and Luther having strong ties to the region. Thuringia offers stunning green landscapes, meandering rivers, and idyllic lakes, with the Thuringian Forest covering large areas of the state. In Ilmenau, the Kickelhahn monument – situated atop the verdant woods – serves as a tribute to Goethe's profound connection to the town. It not only offers breathtaking panoramic views of the Thuringian landscape but also features verses from Goethe's immortal poetry, translated into multiple languages. Thuringia has a strong tradition of academic excellence and innovation, particularly in the fields of technology, engineering, and biotechnology.

Ilmenau, located in the picturesque valley of the Ilm River and nestled in the northern foothills of the Thuringian forest, is more than a living monument to the past. Once renowned for its exquisite glass and porcelain craftsmanship, Ilmenau pulsates with a dynamic energy as a science and technology centre.

For TU Ilmenau students, this blend of heritage and innovation offers ample opportunities, such as forging connections with experienced and visionary mentors, fellow students, and pioneering companies. It allows them to immerse themselves in a realm where theoretical knowledge meets real-world application.

Ilmenau is well-connected by public transport and positioned at an equal distance (about two hours) from the major German cities of Berlin, Frankfurt, and Munich, as well as their international airports.

Contact

Technische Universität Ilmenau

Communications Research Laboratory

Univ Prof Dr Martin Haardt

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✉ mscsp@tu-ilmenau.de

🌐 Course website: <https://www.tu-ilmenau.de/en/study/before-the-study/range-of-courses/master/communications-and-signal-processing-msc>

📘 <https://www.facebook.com/TU.Ilmeneau>

🌐 <https://www.linkedin.com/school/tu-ilmenau/>

Last update 24.11.2024 05:21:53

International Programmes in Germany - Database

www.daad.de/international-programmes

www.daad.de/sommerkurse

Editor

DAAD - Deutscher Akademischer Austauschdienst e.V.

German Academic Exchange Service

Section K23 – Information on Studying in Germany

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www.daad.de

GATE-Germany

Consortium for International Higher Education Marketing

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".

The publication is funded by the German Federal Ministry of Education and Research and by contributions of the participating German institutions of higher education.



Federal Ministry
of Education
and Research