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# Master's degree

**Master Embedded Systems for Mechatronics (ESM)**  
Dortmund University of Applied Sciences and Arts • Dortmund

## Overview

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<th><strong>Degree</strong></th>
<th>Master of Engineering (MEng)</th>
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| **In cooperation with** | University of the Basque Country, Bilbao, Spain  
Norwegian University of Science and Technology (NTNU), Trondheim, Norway  
KU Leuven, Leuven, Belgium  
Kiev National University of Construction and Architecture (KNUCA), Kiev, Ukraine  
Ternopil National Economic University (TNEU), Ternopil, Ukraine  
Technikum Wien, Austria  
KTU Kaunas, Lithuania  
Riga Technical University, Latvia |
| **Teaching language** | English |
| **Languages** | Courses are held in English (100%). Students can use German for written assignments and their theses, too. |
| **Programme duration** | 4 semesters |
| **Beginning** | Winter semester |
| **More information on beginning of studies** | Winter semester - first Monday in October |

**Application deadline:**  
15 July for the following winter semester  
(EU and non-EU applicants: Please check our website for application details specific to your citizenship.)

**Pre-application process:**  
The Course Management offers an application pre-check of the relevant documents (Bachelor's degree, Bachelor’s transcript, language certificate) for determination of eligibility according to our examination regulations. We start with the pre-check in April. These documents can be sent in one merged PDF file with a maximum size of 16348KB/16MB to  

`service-esm@fh-dortmund.de`

A few weeks later, after the pre-check documents have been checked, applicants get the pre-check results by e-mail.

**Application process:**  
We only accept online applications. The application platform for non-EU applicants opens 1 April and for EU applicants on 15 May.
Tuition fees per semester
in EUR

None

Combined Master's degree / PhD programme

No

Joint degree / double degree programme

No

Description/content
Intelligent Technical Systems – also known as Embedded Systems – are a response to the complexity and dynamics operating in application domains of today and tomorrow. Technical systems must respond to the environment in order to adapt and interact. They have to be intelligent to meet challenges such as sustainability, safety and appropriateness for humans. The improvement of the intelligence of technical systems is a key task for the developers of tomorrow’s products. Therefore, the focus of the Master’s programme in Embedded Systems for Mechatronics lies on processes, methods and tools for the development of intelligent technical systems, primarily mechatronic and embedded systems. Following the paradigm of applied science, these processes, tools, and methods will be taught in connection with industrial use cases in the relevant application domains, including automotive, medical, and energy systems.

Course Details

Course organisation
The first two semesters consist of five modules each (6 ECTS). In the second and third semesters, students may study their chosen specialisation (Elective 1, Elective 2, and Elective 3) at the university in the consortium (FH Dortmund, University of the Basque Country Bilbao, NTNU Trondheim, KTU Kaunas) that offers the chosen specialisation. The programme finishes with a Master’s thesis in the fourth semester.

First and second semesters:
See below for content details of modules.

Third semester:
Specialisation (see elective modules below) and research project (thesis)

Fourth semester:
Master’s thesis

Compulsory modules
First semester - Mathematics for Signals & Controls (MOD1-01)
First semester - Distributed and Parallel Systems (MOD1-02)
First semester - Embedded Software Engineering (MOD1-03)
First semester - Requirements Engineering (MOD1-04)
First semester - Scientific & Transversal Skills (MOD1-05)

Second semester - Mechatronic Systems Engineering (MOD2-01)
Second semester - Microelectronics & HW/SW-Co-Design (MOD2-02)
Second semester - R&D Project Management (MOD2-03)
Second semester - Signals and Control Systems 1 (MOD2-04)
Second semester - Elective 1 (MOD2-05)

Third semester - Elective 2 (MOD3-01)
Third semester - Elective 3 (MOD3-02)
Third semester - Research Project (Thesis) (MOD3-03)

Elective Modules:
- Applied Embedded Systems (MOD-E01)
- Smart Home & Smart Building & Smart City (MOD-E02)
- SW Architectures for Embedded and Mechatronic Systems (MOD-E03)
- Signals and Systems for Automated Driving (MOD-E04)
- IoT & Edge Computing (MOD-E05)
- Computer Vision (MOD-E06)
- Signals & Control Systems 2 (MOD-E07)
- Formal Methods (MOD-E08)
- System on Chip Design (MOD-E09)
- Automotive Systems (MOD-E10)
- Hardware Project (MOD-E11)
- Model Based Systems Engineering (MOD-E12)
- Software for Robots (MOD-E13)
- Embedded Systems Hardware Design and Rapid Prototyping (MOD-E14)
- Research Seminar (S)

Further information and detailed descriptions of each course can be found here: https://www.fh-dortmund.de/de/fb/4/lehre/esm/modules_electives.php

### PDF Download

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<th>Types of assessment</th>
<th>Assessment is partly (50%) based on students' research results and the results of teamwork and presentations. Final written or oral exams are included in all courses (50%). The course of study comprises 120 ECTS in total - 30 ECTS for each semester.</th>
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<tbody>
<tr>
<td>A Diploma supplement will be issued</td>
<td>Yes</td>
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| International elements | - International guest lecturers  
- Language training provided  
- Training in intercultural skills  
- Courses are led with foreign partners  
- Integrated study abroad unit(s) |
| Integrated study abroad unit(s) | The third semester will focus on a project in one selected area leading to a specialisation in one of the application domains for embedded systems. Typically, participants spend this semester at a university within the consortium (FH Dortmund; KU Leuven; University of the Basque Country, Bilbao; NTNU Trondheim; KTU Kaunas; and Technikum Wien, Austria). Projects can also be organised as joint projects within the consortium. An overview of cooperation programmes with the partner universities can be found here:  
http://www.go-study-europe.de/  
Conference and Summer School:  
https://go-study-europe.de/do-irc-sus/  
KTU Kaunas:  
https://fi.ktu.edu/  
KU Leuven:  
https://onderwijsaanbod.kuleuven.be/opleidingen/e/CQ_52922109.htm  
https://onderwijsaanbod.kuleuven.be/opleidingen/e/CQ_53302800.htm  
NTNU Trondheim:  
https://www.ntnu.edu/studies/msproman  
https://www.ntnu.edu/studies/msinfosyst  
University of the Basque Country:  
https://www.ehu.eus/en/web/master/master-project-management  
Technikum Wien:  
https://www.technikum-wien.at/en/study_programs/master_s/embedded_systems/ |
| **Special promotion / funding of the programme** | • DAAD  
• ERASMUS+ |
| **Name of DAAD funding programme** | DAAD Strategic Partnerships |
| **Course-specific, integrated German language courses** | Yes |
| **Course-specific, integrated English language courses** | No |
| **The course of study can be taken entirely online** | No |
| **Digital learning and teaching modules** | • MOOCs  
• Online seminar  
• Wikis  
• Virtual classrooms  
• Video learning  
• Chats with lecturers |
| **Description of e-learning elements** | E-learning platform ILIAS |
| **Participation in the e-learning course elements is compulsory** | Yes |
| **Can ECTS points be acquired by taking the online programmes?** | Yes |
| **Can the e-learning elements be taken without signing up for the course of study?** | No |

## Costs / Funding

| **Tuition fees per semester in EUR** | None |
| **Semester contribution** | Enrolment fees are approx. 310 EUR per semester. The fee includes a semester ticket covering public transport in the state of North Rhine-Westphalia (NRW). |
| **Costs of living** | Approx. 850 EUR per month to cover personal expenses |
| **Funding opportunities within the university** | No |
Requirements / Registration

Academic admission requirements

Academic admission requirements include a Bachelor of Science or Bachelor of Engineering (three or four years), engineering degree (Dipl-Ing) in computer science, electrical engineering, or information technology; or foreign equivalent with a final grade of at least "good" (2.5). It must be evident that previous studies included a thesis. Previous studies must include sufficient knowledge in computer science, electrical engineering, and embedded systems.

Language requirements

Applicants must provide proof of their English skills:

- TOEFL iBT 90 points (Internet-based)
- TOEFL itp 550 points
- IELTS 6.5
- or equivalent

Certificates should not be older than two years.

Application deadline

Application deadline:

15 July for the following winter semester
(EU and non-EU applicants: Please check our website for application details specific to your citizenship.)

Pre-application process:

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Application process:

We only accept online applications. The application platform for non-EU applicants opens 1 April and for EU applicants on 15 May.

Submit application to

Only online application is allowed. Please send all requests to:

service-esm@fh-dortmund.de

Find more information on our website:

https://www.fh-dortmund.de/esm

Possibility of finding part-time employment

Not offered by the university

Students have good chances to find a paid internship or student job, especially in the third and fourth semester.
Our Partners

Master Programme Embedded Systems for Mechatronics (ESM) at FH Dortmund

From university to high-tech industry, turn your wish into reality with the ESM Master’s programme at Dortmund University of Applied Sciences and Arts. Master’s students and alumni from Latin America, the USA and Russia share their experience of the programme: how studying was for them, studying based on projects and applying their knowledge to practical experience in the high-tech industry.

» more:
https://youtu.be/43ukiQsWd1M

Dortmund University of Applied Sciences and Arts
It was officially founded in 1971, but the original institute, the “Königliche Werkmeisterschule für Maschinenbauer”, was established in 1890. Nevertheless, the fundamental concept has remained unchanged throughout the years: study and teaching geared towards practical problem-solving, taught by highly experienced professors, cementing the link between theory and practice. True to this philosophy, the university offers over 80 study options, in eight different faculties: applied social sciences, architecture, design, computer sciences, economics, mechanical engineering, information technology, and electrical engineering. More than 14,500 students are currently enrolled at Dortmund University of Applied Sciences and Arts. The world is changing – and a modern university is changing, too.

Intense research for the practice

Versatile, interdisciplinary and practical – this is the guiding principle for research at Dortmund University of Applied Sciences and Arts. Approximately 200 researchers work on projects in a wide range subjects. Innovation is created by the interaction between science and economics, and it is thus not surprising that 95% of all research is in cooperation with external partners. This provides diverse benefits for our students. Our Vice Rector for Research, Development and Transfer, Prof Dr Andrea Kienle, believes that students who have worked in such research projects are particularly attractive as potential employees for private and public employers. With easy access to research facilities, Dortmund University of Applied Sciences and Arts is a very attractive partner for small and medium-sized businesses in Dortmund and the surrounding region. A network based on mutual exchange means mutual benefits for all concerned.

Internationality: engaged worldwide – welcoming guests from all over the world

From the university out into the world, and from the world to the university: this characterises international diversity at the Dortmund University of Applied Sciences and Arts. Irrespective of where our students come from, whether they come from Brazil, Cameroon, Cuba or Ukraine, they all help shape the international profile of Dortmund University of Applied Sciences and Arts. “The university thrives on the cultural variety of our students,” says Gisela Moser, lecturer for Student Services and International Affairs. The other side of internationality involves awakening potential. The goal is to motivate students to go abroad for at least one semester. By going abroad, students improve their language skills, develop intercultural competences and develop their own personalities.

Family-friendly university

We are committed to supporting both students and staff in achieving an equitable balance between studies, professional life and family life. This is not just a question of providing good and reliable childcare. It also involves finance as well as the organisation of study and work. With a help desk and central office, the family service supports and advises students and staff on such issues. The service can also provide help with arranging home care and study or business matters.
University location

Go study in Dortmund

FH Dortmund University of Applied Sciences and Arts welcomes foreign students who want to come and study at the Faculty of Computer Science as degree-seeking students or exchange students who study here for one or two semesters.

The Faculty of Computer Science receives international students from all over the world. They usually come from partner institutions and follow a course of study agreed with their home institutions or participate in our international Master’s courses of study as degree-seeking students.

Foreign students have access to all campus facilities and are assisted by the International Office in all matters of enrolment, housing and visas. The following website contains general information for all incoming international students, from application forms to health insurance matters:


To find out what the city of Dortmund has to offer, see the following website for information and impressions of this dynamic city in the Ruhr area.


Contact

Dortmund University of Applied Sciences and Arts
Computer Science

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Emil-Figge-Straße 38
44227 Dortmund

masteresm@fh-dortmund.de
Course website: https://www.fh-dortmund.de/esm

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International Programmes in Germany - Database

www.daad.de/international-programmes
www.daad.de/sommerkurse

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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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