

**Degree Regulations for the
Master's Degree
"Automation and Robotics"
in the Faculty of Electrical Engineering and Information Technology
of**

The University of Dortmund has issued the following Degree Regulations as university bylaws pursuant to section 2 (4) and section 86 (1) of the Universities Act for the land of North Rhine-Westphalia (Universities Act - UA) of 14th March 2000 (Gazette NRW. p. 190), lastly modified via law of 28th January 2003 (Gazette NRW p. 36 – no bulletin):

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Art. 1 Scope

These Degree Regulations govern the degree programme Automation and Robotics at the University of Dortmund on the basis of the master's degree examination regulations (MDER).

Art. 2 Admission to the degree programme

- (1) The conditions for admission to the master's degree in Automation and Robotics at the University of Dortmund are stipulated in Art. 3 of the MDER and in the admission regulations.

- (2) Teaching at the University of Dortmund is provided in an annual cycle. The cycle starts in the winter semester. For this reason, new students are only admitted to the university in the winter semester.
- (3) For German applicants the Student Secretariat is responsible for all matters concerning applications, admissions and matriculation, with the exception of the specialist evaluation of the precondition for admission; for foreign applicants these functions are carried out by the Foreign Students Office of the University of Dortmund.

Art. 3 Forms of courses

- (1) Lectures are used to impart mainly theoretical facts through illustration by a lecturer. Lectures are usually supplemented by classes and frequently by practical experiments.
- (2) In classes students are given the opportunity to check the success of their mainly independent work on problem examples with the help of a research assistant . In addition, scientists illustrate typical examples of problem processing in classes. This helps students to deepen their knowledge and to obtain a certain level of familiarity with the material. Active participation in classes is an essential precondition for sitting examinations successfully.
- (3) Practical experiments provide an experimental illustration of problems that were presented theoretically and provide students with skills in handling and using the relevant technical appliances and faculties. A group of max. 3 students may carry out a practical experiment together.
- (4) A practical course consists of several practical experiments. The organization and the work scope of a practical course are governed by Art. 16 (2) MDER.
- (5) The project seminar is used for working in collaboration with other students on a technical/scientific problem. All project seminars of one term are presented to the students in a joint lecture at the beginning of the time in which the university is in session. One project seminar consists of at least 5 and at most 12 students. The organization and the work scope of a project seminar are governed by Art. 16 (1) MDER.
- (6) The seminar is used to deepen the knowledge in specific areas and to exercise oneself in presenting and discussing a specific technical topic. During the preparation of the presentations the students are supervised by research assistants. One seminar covers at least 6 presentations. The organization and the scope of work of the seminar is ruled by Art. 16 (3) MDER.
- (7) Excursions are used to combine optimally course contents and occupational practice by visits to major installations, production or research installations in the field of automation and robotics.
- (8) Colloquiums provide students with an optional teaching offer. In colloquiums internal and external scientists give talks on special subjects and then discuss the scientific findings with those present.

- (9) In the master's degree thesis students are to solve a technical/scientific problem from the field process automation or robotic independently and by applying scientific methods. Art. 18 of the MDER stipulates the procedure, supervision and scope of work for master's degree theses¹.

Art. 4 Modularisation

For a successful occupational activity in the fields process automation and robotics knowledge from different engineering sciences and scientific methods is necessary, which complies with the selected major field of study and the specialisation within the selected major field of study. For a better organisation the advanced specialist studies (Art. 15 (1) MDER) is subdivided into multiple modules.

- (a) Control
- (b) Robotics
- (c) Process Automation
- (d) Mathematics
- (e) Optimization
- (f) Systems
- (g) Sensors and Signal Processing

Art. 5 Study advice

General study advice for the degree programme in automation and robotics is provided by the student advisory service of the degree programme (Art. 5 (4) MDER). The respective lectures concerned with the degree programme are responsible for providing advice on special technical questions. Advice on general questions is provided by the central study advice service of the University of Dortmund.

Art. 6 Grants

Information on grants and on various advice centres for students can be found in the lectures timetable and on different notice boards. Further information can be provided by the student advisory service of the degree programme. The Student union of the University of Dortmund is responsible for grants under the Federal Educational Grants Act. Foreign students should contact the foreign students office for information on grants.

Art. 7 Courses for the master's degree

- (1) To acquire the necessary broad basic education for the degree programme "Automation and Robotics" the students need to attend successfully courses of different subjects during the first term. The assignment of courses to the basic

¹ Im Original steht "Diplomarbeit"

specialist studies (Art. 15 (1) MDER) is given in Annex A of this degree regulation. Annex A also specifies how many credit points according to Art. 6 (2) MDER can be obtained for each course.

- (2) Annex A contains also the assignment of the courses to the specific modules of the advanced specialist studies, how many credit points can be obtained for each course and if necessary the assignment of a course to a major field of study.
- (3) The assignment of courses of the general education (Art. 15 (1) MDER) and the specification of the number of obtainable credit points for each course is also given in annex A. Furthermore the students may apply in writing to the board of examiners referred to in Art. 5 MDER for a course that is not contained in the catalogue of general education to be accepted for them as being part of this catalogue. The board of examiners shall decide on this application and if it approves shall fix in agreement with the respective lecture the number of credits that can be acquired for this course.
- (4) The catalogues for the master's degree and the assignment of the modules may be amended through a resolution of the faculties that are involved in the master's degree in order to realise a change to the teaching range that has been made necessary as a result of technical changes or other circumstances.

Art. 8 Syllabus for the master's degree

- (1) Students shall gain all credit points of the technical basic education and shall if appropriate fulfil the requirements of the board of examiners (Art. 3 (3) MDER) during the first term. All other credit points with the exception of the credit points achievable for the master thesis shall be gained during the second and third term.
- (2) If robotics is selected as major field of study the following minimum values of credit points to be gained with respect to the modules apply in the scope of the advanced specialist studies:

(a) Robotics	at least	12 credit points
(b) Control	at least	6 credit points
(c) Module A	at least	9 credit points
(d) Module B	at least	9 credit points

The credit points out of the catalogue practical course can only be gained by courses that are assigned to the major field of study named robotics. For module A only the modules Mathematics or Optimisation are available. For module B every module can be selected, out of which no credit points are gained so far.

- (3) If process automation is selected as major field of study the following minimum values of credit points to be gained with respect to the modules apply in the scope of the advanced specialist studies:

(a) Process Automation	at least	12 credit points
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|--------------|----------|-----------------|
| (b) Control | at least | 6 credit points |
| (c) Module A | at least | 9 credit points |
| (d) Module B | at least | 9 credit points |

The credit points out of the catalogue practical courses can only be gained by courses that are assigned to the major field of study named Process Automation. For the module A only the modules Mathematics and Optimisation are available. For the module B every module can be selected, out of which no credit points are gained so far.

Art. 9 Effective date and publication

These master's degree regulations shall come into force on .

These master's degree regulations shall be published in the official gazette of the University of Dortmund.

Done in accordance with the resolution of the faculty council of the Faculty of Electrical Engineering and Information .

Dortmund,

Rector of the University of Dortmund

Professor Dr. Eberhardt Becker

Annex A Courses of the master's degree

Basic Specialist Studies

Name	Lecture	Class	Credits
Advanced Engineering Mathematics	3 SWH	2 SWH	7
Computer Systems	3 SWH	1 SWH	6
Control Theory and Applications	3 SWH	2 SWH	7
Fundamentals of Robots	3 SWH	2 SWH	7
Object Oriented Programming		3 SWH	3

Advanced Specialist Studies

Module Control

Name	Lecture	Class	Credits
Logic Control	2 SWH	2 SWH	6

Module Robotics

Name	Lecture	Class	Credits
Robotic Theory	2 SWH	1 SWH	4.5
Autonomous Robots	2 SWH	1 SWH	4.5
Applications of Robots	2 SWH		3
Simulation in Robotics	2 SWH	1 SWH	4.5

Module Process Automation

Name	Lecture	Class	Credits
Control Design	1 SWH	1 SWH	3
Advanced Process Control	1 SWH	1 SWH	3
Batch Process Operation	1 SWH	1 SWH	3
Modeling of Dynamic Systems 1	1 SWH	1 SWH	3
Modeling of Dynamic Systems 2	1 SWH	1 SWH	3

Module Mathematics

Name	Lecture	Class	Credits
Numerical Solution of Differential Equations	2 SWH	1 SWH	4.5
Mathematics of Kinematics	2 SWH	1 SWH	4.5
Mathematical and Practical Aspects of Finite Elements	2 SWH	1 SWH	4.5
Statistics for Researchers in Engineering Sciences	2 SWH	1 SWH	4.5

Module Optimisation

Name	Lecture	Class	Credits
Optimization	2 SWH	1 SWH	4.5
Scheduling Problems and Solutions	2 SWH	1 SWH	4.5
Computational Intelligence	2 SWH	1 SWH	4.5

Module Sensors and Signal Processing

Name	Lecture	Class	Credits
Signal Processing for Robotics and Control	2 SWH	1 SWH	4.5
Cognitive Computer Vision	2 SWH	1 SWH	4.5
Sensors	2 SWH	1 SWH	4.5

Module Systems

Name	Lecture	Class	Credits
Introduction to Embedded Systems	3 SWH	1 SWH	6
Distributed Systems	3 SWH	1SWH	6
Discrete and Hybrid Systems	2 SWH		3
Local Networks-Communication & Control	2 SWH	1 SWH	4.5

Lab Work

Name	Field	Credits
Process Control Lab	Process Automation	4
Practical Training Robotics	Robotics	4

General Educations

Name	Lecture	Class	Credits
German I	0 SWH	4 SWH	4
German II	0 SWH	4 SWH	4
Speaking Technical English	0 SWH	2 SWH	2
Presentation in Technical English	0 SWH	2 SWH	2