

**Examination Regulations  
for the Master Course Embedded Systems for Mechatronics  
of the Faculty of Information Technology and Electrical Engineering  
of Dortmund University of Applied Sciences and Arts (Fachhochschule  
Dortmund)**

**As of 1<sup>st</sup> March, 2016**

Whilst every effort has been made to ensure the above information is an accurate translation of the Examination Regulations for the master course Embedded Systems for Mechatronics of the Faculty of Information Technology and Electrical Engineering of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund) - Official Notes – Public Announcement, Volume 34, no. 78, 23.08.2013 - Fachhochschule Dortmund accepts no legal liability for its contents and reserves the right to make alterations and amendments if and when required.

**Programme Examination Regulations  
for the Master Course Programme Embedded Systems for Mechatronics  
of the Faculty of Information Technology and Electrical Engineering  
of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund)**

**As of 1<sup>st</sup> March, 2016**

In accordance with § 2 subsection 4 clause 1 and § 64 subsection 1 in conjunction with § 22 subsection 1 no. 3 of the “Gesetz über die Hochschulen des Landes Nordrhein-Westfalen” (North-Rhine Westphalian University Act, abbreviated: HG) as amended by article I of the “Hochschulzukunftsgesetz” (Future Higher Education Act) of 16<sup>th</sup> September 2014 (Law and Ordinance Gazette NRW. p. 547) Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund), has issued the following Programme Examination Regulations:

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## I. Preamble

The master study course Embedded Systems for Mechatronics leads to a degree which qualifies individuals both in the field of scientific research as well as in areas of professional practice. They are being prepared for technical careers but also for senior management assignments in technical projects. Furthermore, a subsequent career in academic research is also an option. The programme is intended to provide students with the required technical knowledge, skills and methods. In order to meet the requirements and changes in the professional world, the contents of the individual modules are taught in an application-oriented manner, based on research findings. Students are thus enabled to analyse processes and problems met in practice and to work out professional solutions while recognizing the wider implications of their actions. Furthermore, students are enabled to participate in the academic debate within their area of expertise. Apart from acquiring technical and methodical competence, students are encouraged to develop their personal and social skills. Students acquire professional skills and are able to act responsibly. International competences are promoted by studies abroad, in particular at the partner universities during the optional third semester abroad.

The master programme Embedded Systems for Mechatronics enables students to develop their distinctive profile within the scope of their main focus areas while simultaneously completing the compulsory courses of the first and second semester. In particular through the subject range offered by the Ruhr Master School (RMS), the compulsory elective studies are integrated in a cross-university network. The RMS aims at creating a joint master programme of the universities in the Ruhr Area in the technical disciplines to provide a special offer of master programmes with a comprehensive research curriculum. This offer is completed by international, project-oriented components and summer schools as well as symposia. The RMS also allows students of the participating universities a simplified transition from the bachelor programmes to the joint master programmes. The RMS strives to facilitate the positioning of the master programmes by transferring the latest research findings into practical applications and ensuring the universities' contribution to the transition of the Ruhr Area to a high-tech location.

The language of instruction is English.

The master course programme Embedded Systems for Mechatronics was developed and organised by the Faculties of Information Technology and Electrical Engineering, and Computer Science. The Faculty of Information Technology and Electrical Engineering assumes the responsibility for the organization and delivery of the course programme.

Gender equality is observed in the design and structure of the course programme and its contents.

## II. General Regulations

### § 1

#### **Scope of Application of the Course Programme Examination Regulations, General Examination Regulations**

- (1) The following Programme Examination Regulations (PER) apply to the master course programme Embedded Systems for Mechatronics of the Faculty of Information Technology and Electrical Engineering of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund). They govern the master's examination in these course programmes according to § 64 sub 2 of the North-Rhine Westphalian University Act (HG NRW) in conjunction with the General Examination Regulations of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund) of 19<sup>th</sup> July 2013 (Official Notes – Official Journal – of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund), volume

34, no. 64 of 22-Jul-2013) in the relevant issue.

- (2) These PER specify the General Examination Regulations – hereafter referred to as GER – for the master course programme Embedded Systems for Mechatronics. They specify complementary as well as alternative regulations which do not contradict the General Examination Regulations.

## **§ 2**

### **Objective of the Course Programme, Master's Degree**

[with reference to § 2 of the General Examination Regulations - GER (RahmenPO)]

- (1) The course of studies leading to the master's examination, taking into consideration the general aims of study courses (§ 58 HG), includes in particular the application-related contents of the curriculum on the basis of scientific findings, and is designed to enable students to independently analyse problems using scientific methods and to apply these according to engineering methods while observing aspects relevant to society in general. The course of studies is designed to develop the inventive and creative skills of the students and to prepare them for the master's examination.
- (2) Students complete their course of studies with the master's examination. The master's examination serves to determine whether the students have acquired the advanced professional expertise as well as the methodological and key skills required in order to work independently in their profession, and whether they are capable to work independently in an entrepreneurial context on the basis of scientific findings and methods.
- (3) If the master's Examination has been passed, Dortmund University of Applied Sciences and Arts, Fachhochschule Dortmund, awards the degree Master of Engineering (M.Eng.).
- (4) For the rest, § 2 of the General Examination Regulations applies.

## **§ 3**

### **Modular Structure and Credit Point System**

[with reference to § 3 GER (RahmenPO)]

- (1) The workload for the course of studies amounts to a total of 3,600 hours (900 hours per semester), including time for the master's thesis. From the total 48 weekly hours per semester (Semesterwochenstunden, SWS, 1 SWS = 45 mins.) are allotted to attendance at lecture sessions. Based on these examination regulations, the course of studies is organized in such a way that it allows for completion within the standard course duration (Regelstudienzeit, RSZ).
- (2) To successfully complete the course of studies, a total of 120 credit points according to the European Credit Transfer and Accumulation System (ECTS) must be obtained.
- (3) The modules of the master course programme Embedded Systems for Mechatronics, including its number of hours per week and their distribution over the semesters, are specified in detail in **Attachments 1 and 2**. The descriptions of the modules and lectures are listed in the current version of the module handbook of the master course programme Embedded Systems for Mechatronics.
- (4) Provided they meet the entry requirements and within the scope of the defined intake capacity limits, students in RMS master course programmes can complete compulsory elective modules as cross-registered students at the participating universities by sitting an examination. The number of corresponding credit points obtained in the compulsory elective modules, outside the primary course programme, may amount to up to 12 credit points. The participating universities define the cross-university offer of the compulsory elective modules for each course programme in a catalogue which is published on the RMS website.

- (5) No claims can be asserted with regard to the realization of the complete spectrum of the planned compulsory elective modules. Nor is there any guarantee that these lectures will be held if the number of participants is insufficient. The catalogues of lectures offered will be published before the start of the lecture period of each semester.
- (6) For the rest, § 3 of the General Examination Regulations applies.

#### **§ 4**

##### **Entry requirements**

[with reference to § 4 GER (RahmenPO)]

- (1) Requirements before commencing the course of studies are
  1. the completion of a “Diplom” or bachelor course of study of Information Technology, Electrical Engineering or (Technical) Computer Science at a university of applied sciences (Fachhochschule) or a university, or the completion of a corresponding accredited bachelor qualification programme at a university of cooperative education (Berufsakademie) with an overall grade of at least “good” (2.5). In addition, credit points and examinations in the field of study of Embedded Systems and Software Engineering amounting to a minimum of 40% of the overall volume must be demonstrated.and
  2. evidence of sufficient English skills provided by a TOEFL-ITP test with at least 550 points or a TOEFL-iBT test amounting to a minimum of 90 points passed within the two years before the application was submitted. The evidence may also be provided by other test methods equivalent to the TOEFL test (e.g. IELTS with at least 6.5 points) or by equivalent credit points and examination results. In exceptional cases, sufficient English skills are deemed demonstrated by the completion of a study course in English. Course programmes according to no. 1 at foreign universities must also include a final thesis comparable to the course programmes at German universities with regard to the minimum quality requirements.
- (2) The Faculties of Information Technology and Electrical Engineering, and Computer Science form a joint expert committee to verify whether a course of studies can be defined as relevant according to § 4 subsection 1 no. 1. If there is doubt regarding the comparability of the final thesis in terms of sub. 1 no. 2 the expert committee decides. It can request further documents for a review.
- (3) The expert committee consists of four members, who are elected by the faculty councils of the Faculties of Information Technology and Electrical Engineering and Computer Science from the respective circle of professors involved in the master course programme Embedded Systems for Mechatronics at Dortmund University of Applied Sciences and Arts, Fachhochschule Dortmund. The Faculty of Information Technology and Electrical Engineering and the Faculty of Computer Science each delegate two members.
- (4) The expert committee discusses and decides in closed meetings. It has a quorum if at least three members are present.
- (5) For the rest, § 4 of the General Examination Regulations applies.

**§ 5****Student Advisory Services**

§ 5 of the General Examination Regulations applies.

**§ 6****Start of Study, Normal Course Duration**

[with reference to § 1 subsection 2 clause 2 no. 2 GER (RahmenPO)]

- (1) Students start the master course Embedded Systems for Mechatronics in the winter semester.
- (2) The normal course duration, including all examinations, is four semesters.

**§ 7****Examination Board**

[with reference to § 6 GER (RahmenPO)]

- (1) The examination board for the master course Embedded Systems for Mechatronics of the Faculty of Information Technology and Electrical Engineering is responsible for the organization of the examinations and any further tasks following from these Examination Regulations or from the General Examination Regulations.

The examination board comprises

1. A professor acting as the chair;
  2. A professor acting as deputy;
  3. Two other persons from the circle of professors;
  4. A member of the academic staff (§ 11 sub. 1 No. 2 HG);
  5. two students.
- (2) For the rest, § 6 of the General Examination Regulations applies.

**§ 8****Examiners, Observers**

§ 7 of the General Examination Regulations applies.

**§ 9****Transfer of Credits and Recognition of Examination Results**

§ 8 of the General Examination Regulations applies.

**§ 10****Assessment of Examinations**

§ 9 of the General Examination Regulations applies.

**§ 11****Retaking Examinations, Compensation**

[with reference to § 10 GER (RahmenPO)]

- (1) If a module examination in the compulsory elective modules is finally graded “inadequate”, this may be compensated by passing another module examination from the catalogue of compulsory elective modules. This compensation is only possible once.
- (2) For the rest, § 10 of the General Examination Regulations applies.

**§ 12****Absence, Withdrawal, Fraudulent Behaviour, Breach of Regulations**

§ 11 of the General Examination Regulations applies.

**§ 13****Invalidity of Examinations**

§ 12 of the General Examination Regulations applies.

**§ 14****Inspection of Examination Papers**

§ 13 of the General Examination Regulations applies.

**§ 15****Appeal Procedure**

§ 14 of the General Examination Regulations applies.

**§ 16****Retention Periods for Examination Documents**

§ 15 of the General Examination Regulations applies.

**III. Mentoring, Student Monitoring, Modules Requiring Intensive Support**

Section II General Examination Regulations (§§ 16 and 17) does not apply.

**IV. Special Programme Contents****§ 17****Key Qualifications**

[with reference to § 18 GER (RahmenPO)]

- (1) Modules which are entirely or partly concerned with the development of key qualifications are part of the curriculum according to **Attachments 1 and 2**. Details are contained in the module descriptions and handbooks.
- (2) For the rest, § 18 of the General Examination Regulations applies.

**§ 18****Semesters Abroad, Work Placement in Germany and Abroad, Practical Semesters**

§ 19 of the General Examination Regulations does not apply.



## V. Examination Elements of the Module Examinations

### § 19

#### Objective and Form

[with reference to § 20 GER (RahmenPO)]

- (1) Module examinations are held in the modules as laid down in **Attachments 1 and 2**.
- (2) Admissible forms of examination are written examinations (§ 23) lasting no more than four clock hours, oral examinations (§ 25) lasting no more than 45 minutes per candidate, assignment papers and seminar presentations (§26), or project related work with documentation and presentation with an oral examination lasting approximately 20 minutes. (§ 24). The project related work must be submitted at the oral examination.
- (3) The module MP13 Research Project (Thesis) must be executed in the form of a research and development project, either individually or as a team effort. The project must be carried out at a university or research institution or as a company project. Alternative project forms must be approved by the examination board. The research project comprises a project thesis and a final presentation.
- (4) For the rest, § 20 of the General Examination Regulations applies.

### § 20

#### Admission to the Module Examinations

[with reference to § 21 GER (RahmenPO)]

- (1) Admission to a module examination is only granted to persons who
  1. are enrolled in the master course programme Embedded Systems for Mechatronics at Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund), or who are admitted as cross-registered students and who are not on leave. Regarding students on leave, § 1 sub. 1 clause 1 no. 1 GER applies;
  2. have made fewer than three valid attempts at an examination in the same or a comparable module or partial module in a master course programme Embedded Systems for Mechatronics, or in a course programme closely related to the master course programme Embedded Systems for Mechatronics.
- (2) Admission must be denied if
  - a) the prerequisites stated in subsection 1 are not met or
  - b) the candidate has failed the same or a comparable examination in Germany in the master course programme Embedded Systems for Mechatronics or in a course programme closely related to the master course programme Embedded Systems for Mechatronics or has definitively failed the master's Examination in a master course programme Embedded Systems for Mechatronics.
- (3) Via the "Online Services for Students (ODS) – Registration for Examinations and Withdrawals", the student can withdraw from module or partial module examinations until one week before the examination date at the latest without this examination then counting towards the possible attempts at the examination.

### § 21

#### Conduct of Examinations

§ 22 of the General Examination Regulations applies.

**§ 22**  
**Written Examinations**

§ 23 of the General Examination Regulations applies.

**§ 23**  
**Project-related Work**

§ 24 of the General Examination Regulations applies.

**§ 24**  
**Oral Examinations**

§ 25 of the General Examination Regulations applies.

**§ 25**  
**Assignment Papers and Seminar Presentations**

§ 26 of the General Examination Regulations applies.

**§ 26**  
**Bonus Points for Work during the Course of a Semester**

§ 27 of the General Examination Regulations does not apply.

**VI. Thesis and Colloquium**

**§ 27**  
**Thesis**

[with reference to § 28 GER (RahmenPO)]

- (1) The thesis is a written work of scientific research in the field of Embedded Systems. It serves to document that the candidate is capable of independently applying scientific and practical techniques to the processing of challenging tasks taken from his area of specialization, including their specialized technical details as well as their wider implications.
- (2) As a rule, the application for admission to the thesis should take place before the end of the third semester.
- (3) For the rest, § 28 of the General Examination Regulations applies.

**§ 28**  
**Admission to the Thesis**

[with reference to § 29 GER (RahmenPO)]

- (1) Candidates are admitted to the thesis provided they
  1. meet the requirements of the module examinations according to § 20 sub. 1;
  2. have passed all module examinations according to **Attachment 1** but for one compulsory module or one compulsory elective module respectively.
- (2) The application must include the following documents unless these have already been provided:
  1. documents confirming the admission requirements according to subsection 1;

2. a declaration whether the candidate has previously not passed, or has definitively not passed, a final thesis or the master examination in a master course programme Embedded Systems for Mechatronics.

A statement should be included indicating which examiner is willing to supervise the final thesis. If the candidate does not suggest a topic, the chairperson of the examination board ensures that the candidate is given a topic.

- (3) Admission must be denied if
  - a) the requirements according to subsection 1 are not met, or
  - b) the documents according to subsection 2 are incomplete, or
  - c) in a master course programme Embedded Systems for Mechatronics in Germany a corresponding final thesis of the candidate, taking into account the possibility to retake the examination, has been graded "inadequate" (5.0), or the candidate has definitively not passed the master examination.
- (4) For the rest, § 29 of the General Examination Regulations applies.

### **§ 29**

#### **Issue of and Work on the Thesis**

[with reference to § 30 GER (RahmenPO)]

- (1) The time allocated to the writing of the thesis is a single, full time period of five months.
- (2) For the rest, § 30 of the General Examination Regulations applies.

### **§ 30**

#### **Submission of the Thesis**

[with reference to § 31 GER (RahmenPO)]

- (1) Three copies of the final thesis must be submitted to the examination committee within the time limit. The full texts of the online sources used in the thesis as well as the text of the thesis itself must be submitted stored on a standard storage device together with the printed version of the thesis. The electronic transfer is inadmissible for the submission of the thesis within the time limit.
- (2) In order to further the students' competence to reflect on their work, an abstract of the key contents and results of the thesis must be provided. If possible, the abstract should not exceed one DIN A4 page and present the approach and the result in abstract form. It must be submitted in English, together with the thesis.
- (3) For the rest, § 31 of the General Examination Regulations applies.

### **§ 31**

#### **Colloquium**

[with reference to § 32 GER (RahmenPO)]

- (1) The colloquium supplements the thesis and both are assessed as a single examination.
- (2) The colloquium lasts approximately 60 minutes and consists of a 30-minute presentation followed by an oral examination of 30 minutes.

**§ 32****Assessment of the Thesis and the Colloquium**

[with reference to § 33 GER (RahmenPO)]

- (1) The thesis and the colloquium are related examinations and must be assigned an overall grade by two examiners. The proportionate weighting is 80 % for the thesis and 20 % for the colloquium. One of the examiners must be a professor of the Faculty of Information Technology and Electrical Engineering, or the Faculty of Computer Science at Dortmund University of Applied Sciences and Arts, Fachhochschule Dortmund.
- (2) For the rest, § 33 of the General Examination Regulations applies.

**VII. Master Examination, Certificates, Records****§ 33****Results of the Master Examination**

[with reference to § 34 GER (RahmenPO)]

- (1) A candidate has passed the master's examination when all prescribed module examinations and the thesis including the colloquium have been awarded a grade equal to or better than "pass" (4.0).
- (2) For the rest, § 34 of the General Examination Regulations applies.

**§ 34****Certificate, Overall Grade, Diploma Supplement, Transcript of Records**

[with reference to § 35 GER (RahmenPO)]

- (1) Candidates who have passed the master's examination, receive the results as a certificate, usually within four weeks of the last examination. The certificate contains information about the course, names of the modules and module grades, the topic of the thesis and the combined grades of the thesis and oral defence, as well as the final grade.
- (2) The final grade for the master's examination is calculated from the weighted arithmetic mean of the individual grades of the module examinations and the thesis including colloquium according to § 9 General Examination Regulations. The following weighting of the grades is applied:

Thesis and Colloquium .....25 %

Arithmetic mean of the grades achieved in the module examinations .....75 %

- (3) For the rest, § 3 of the General Examination Regulations applies.

**§ 35****Additional Modules**

§ 36 of the General Examination Regulations applies.

**§ 36****Master's Certificate**

[with reference to § 37 GER (RahmenPO)]

- (1) Candidates who have passed the master's examination receive a Master's Degree Certificate. It certifies that the master's degree (Master of Engineering, abbreviated M.Eng.) has been awarded according to § 2 sub. 3.

- (2) For the rest, § 37 of the General Examination Regulations applies.

### VIII. Final Provisions

#### § 37

#### Entry into Force and Publication

- (1) These Examination Regulations enter into force on 1 March, 2016.
- (2) These Regulations apply to students entering their studies in the master course programme Embedded Systems for Mechatronics of the Faculty of Information Technology and Electrical Engineering of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund) from summer semester 2016.
- (3) These Regulations also apply to students enrolled in the master course programme Embedded Systems for Mechatronics of the Faculty of Information Technology and Electrical Engineering of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund) according to § 48 HG or admitted as cross-registered students according to § 52 subsection 1 and 2 HG in winter semester 2015/2016.
- (4) These examination regulations are published in the Official Notes – Official Journal -- of Dortmund University of Applied Sciences and Arts, Fachhochschule Dortmund.

Issued based on the resolutions of the Faculty Council of the Faculty of Information Technology and Electrical Engineering of 27.01.2016 as well as the Rectorate of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund) of 01.03.2016.

Dortmund, 1<sup>st</sup> March, 2016

The Rector of Dortmund University of Applied  
Sciences and Arts (Fachhochschule Dortmund)

Prof. Dr. Schwick

The Dean of the Faculty of Information  
Technology and Electrical Engineering of  
Dortmund University of Applied Sciences and  
Arts (Fachhochschule Dortmund)

Prof. Dr. Wißing

## Attachment 1

**Modules, module examinations and periods; student workload; credit points according to the European Credit Transfer and Accumulation System (ECTS)**

1st semester (winter semester)					
module	module examination	student workload			ECTS-points
		contact hours		self-study (hrs)	
		weekly hrs per semester	hrs		
Control Theory and Systems	ME 1	4	60	120	6
Distributed and Parallel Systems	ME 2	4	60	120	6
Embedded Software Engineering	ME 3	4	60	120	6
Requirements Engineering	ME 4	4	60	120	6
Introduction to Embedded Systems Design	ME 5	4	60	120	6
<b>Total</b>	<b>5</b>	<b>20</b>	<b>300</b>	<b>600</b>	<b>30</b>

  

2nd semester (summer semester)					
module	module examination	student workload			ECTS-points
		contact hours		self-study (hrs)	
		weekly hrs per semester	hrs		
Mechatronic Systems Engineering	ME 6	4	60	120	6
Microelectronics & HW/SW Co-Design	ME 7	4	60	120	6
R&D Project Management	ME 8	4	60	120	6
Signal Processing	ME 9	4	60	120	6
Elective 1 *	ME 10	4	60	120	6
<b>Total</b>	<b>5</b>	<b>20</b>	<b>300</b>	<b>600</b>	<b>30</b>

  

3rd semester (winter semester)					
module	module examination	student workload			ECTS-points
		contact hours		self-study (hrs)	
		weekly hrs per semester	hrs		
New Trends in Research	ME 11	4	60	120	6
Elective 2 *	ME 12	4	60	120	6
Research Project (Thesis)	ME 13	0	0	540	18
<b>Total</b>	<b>5</b>	<b>20</b>	<b>120</b>	<b>780</b>	<b>30</b>

  

4 th semester (summer semester)					
module	examination	student workload			ECTS-points
		contact hours		self-study (hrs)	
		weekly hrs per semester	hrs		
Master Thesis and Colloquium	P	0	0	900	30
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>900</b>	<b>30</b>

\*cf Attachment 2

## Attachment 2:

## Catalogue of Electives (Electives 1 and 2)\*

2nd semester					
	module examination	student workload			ECTS-points
		contact hours		self-study (hrs)	
		Weekly hrs per semester	hrs		
Applied Embedded Systems	MOD-E01	4	60	120	6
Biomedical Systems	MOD-E02	4	60	120	6
Automotive Systems	MOD-E03	4	60	120	6
SW Architectures for Embedded and Mechatronic Systems	MOD-E04	4	60	120	6
3rd semester					
Computer Vision	MOD-E05	4	60	120	6
Formal Methods in Mechatronics	MOD-E06	4	60	120	6
Model Based and Model Driven Design	MOD-E07	4	60	120	6
SoC Design	MOD-E08	4	60	120	6
Modules from other cooperating universities					
Modules from FH Dortmund international course programmes**					

\* From the Catalogue of Electives a minimum of 2 modules must be completed with an examination (MP 10 and MP 12 according to Attachment 1). Due to the varying number of credit points of the compulsory elective modules, more than two compulsory elective modules may be required to obtain the minimum number of 12 credit points or more than 12 credit points may be obtained which will be marked in the certificate.

\*\* If compulsory elective modules of the Ruhr Master School (RMS) are part of the course programmes of Dortmund University of Applied Sciences and Arts (Fachhochschule Dortmund), students must complete the examinations within their own course programme.

Upon application, modules of the course programmes participating in the RMS may be elected.