

**Faculty of**  
**Electrical Engineering, Computer Science and Mathematics**

**Examination Regulations  
for the Master's Program in  
Electrical Systems Engineering  
at the University of Paderborn**

**Released on: 30 April 2012**

Note: The following translation of the German "Prüfungsordnung" for the Master's program in Electrical Systems Engineering is offered here for convenience of our international students. Legally valid is the German version only.

The University of Paderborn has issued the following examination regulations on the basis of Section 2 (4) and Section 64 (1) of the State of North Rhine-Westphalia Higher Education Act (*Hochschulgesetz*, "HG") of 31 October 2006 (NRW Law and Ordinance Gazette p. 474), last amended by Article 1 of the Law on Alteration of the Higher Education Act, the Art Colleges Act of the State of NRW and other regulations of 31 January, 2012 (GV. NRW.2012. p. 90):

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## **I. General**

### Section 1

#### **Applicability and academic degree**

- (1) These examination regulations apply to the Masters's program Electrical Systems Engineering.
- (2) Upon successful completion of the Master's program the Faculty of Electrical Engineering, Computer Science and Mathematics awards the degree of Master of Science, abbreviated as M. Sc. and issues a degree certificate.

### Section 2

#### **Aim of program and language arrangement**

- (1) The Master's program is designed to give candidates advanced engineering foundations and specific knowledge, skills and methods in the field of Electrical Systems Engineering. In addition to the general study aims according to Section 58 of the HG, the program enables students to apply and further develop the scientific methods of Electrical Systems Engineering in their work and to act responsibly with regard to the effects of technological change.
- (2) The purpose of the Master's examination is to determine whether the candidates have broadened the knowledge necessary for professional practice which they gained in their preceding first degree and developed it in selected areas so that they are able to apply appropriate scientific methods from the field of Electrical Systems Engineering in order to solve problems and further develop them in their area of specialization.
- (3) The Master's program is taught in English. All written work is in English.

### Section 3

#### **Admission Prerequisites**

- (1) Admission to the Master's program in Electrical Systems Engineering is open to anyone meeting the following prerequisites:
  1. have a university entrance qualification certificate (general or relevant subject-linked university entrance qualification), or a certificate recognized as equivalent under a legal provision or by the competent state body, or meeting the qualification requirements for professional training,
  2. hold a first university degree qualifying for a profession obtained at a university within the jurisdiction of the German Basic Law in the standard period of study of at least 6 semesters electrical engineering or a comparable course of study, demonstrating the educational requirements for the Master's program pursuant to paragraph 2, or hold an equivalent degree from a foreign university. For determining the equivalence of foreign degrees the agreements of equivalence as approved by the Conference of the Ministers of Education and Cultural Affairs and the German Rectors' Conference or corresponding legal provisions have to be considered. If there are doubts about the equivalence of achievements the Central Office for Foreign Education may be consulted,
  3. pass the final examination according to no. 2 hereof with an overall grade of at least 2.5 (or an equivalent foreign final grade),
  4. have sufficient knowledge of English according to paragraph 4 hereof.
- (2) The educational background within the meaning of paragraph 1 (2) requires that the applicant has the knowledge/skills necessary for a successful completion of the Master study program ESE in the areas listed below.
  - a) Higher Mathematics
  - b) Signal Theory

- c) System Theory
- d) Field Theory

They have to be comparable to those of the Electrical Engineering Bachelor program offered at the University of Paderborn and are prerequisite for a successful completion of the Master's study program.

- (3) The Examination Committee decides on the comparability of the subject and the knowledge/skills according to paragraph 1 (2) and paragraph 2, respectively. The Examination Committee may make the admission subject to the stipulation of proving specific knowledge prior to registering for the Master's thesis. The type and scope of these stipulations are determined individually based on the completed courses taken in the preceding completed final degree.
- (4) Sufficient knowledge of the English language is demonstrated by:
  - a) A Bachelor's degree from an English-speaking country<sup>1</sup> or an accredited English-language degree program in Germany or
  - b) Test of English as a Foreign Language (TOEFL) "Internet-based" Test (iBT) with a result of at least 80 points or
  - c) TOEFL "Paper-based" Test (PBT) with a result of at least 550 points or
  - d) IELTS-Test with a result of at least 6.0 or
  - e) Cambridge-Test – Certificate in Advanced English (CAE) or tests of an equivalent level.
- (5) Admission will be denied in the following cases:
  - a) If the above conditions are not fulfilled; or
  - b) If the documents are incomplete; or
  - c) If the candidate has definitely failed an examination in the Electrical Systems Engineering Master's program or in a related or comparable degree program at a scientific university within the jurisdiction of the German Basic Law. In the related or comparable degree programs refusal of admission is limited to the case where a compulsory examination in the Electrical Systems Engineering Master's program which is to be regarded as equivalent has been failed; or
  - d) If the candidate is already sitting a comparable examination in the same or a related degree program at another university; or
  - e) If entitlement to take the examination has been forfeited.

#### Section 4

#### **Regular Duration and Extent of Study / Required Coursework**

- (1) The regular length of the Master's program including the Master's examination is four semesters.
- (2) The program comprises classes in compulsory, compulsory optional and compulsory electives areas which are grouped together by subject matter into modules, and the Master's thesis.
- (3) The scope of the Master's program is measured in terms of credits which correspond to the points awarded under the European Credit Transfer System (ECTS). One credit corresponds to a workload of 30 hours on average. The overall scope of the Master's program is 120 credits.

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<sup>1</sup> For the purposes of these Regulations these are Australia, the United Kingdom, Ireland, Canada, New Zealand and the United States of America.

- (4) On the basis of these Examination Regulations the Faculty of Electrical Engineering, Computer Science and Mathematics shall draw up a sample curriculum and descriptions of the modules in the form of a module handbook. The current version of the handbook is published on the website of the Institute of Electrical Engineering and Information Technology. These documents shall provide information in particular about the aims of the individual modules and the classes allocated to the modules as well as the prerequisite skills and contents. The module descriptions shall explain how and to what extent key qualifications such as team leadership, project management, etc. can be acquired. These qualifications form part of the assessment.
- (5) The study contents described in the module handbook are selected and limited in content so that the program can be completed within the regular program length.
- (6) The Master's program includes a general studies course ("Studium Generale") comprising six credits to be chosen from classes outside the field of Electrical Systems Engineering. The Examination Committee issues a list of recommended classes which is published on the website of the Institute of Electrical Engineering and Information Technology. Students with insufficient German skills are advised to take two German courses as part of their General Studies.

#### Section 5 **Modular System and Forms of Teaching**

- (1) The Electrical Systems Engineering Master's program is provided in a modular form. Modules are independent, examinable qualification units that are complete in terms of topic and time, self-contained, and have credits attached. At the end of each module an examination has to be passed and marks and credits are awarded on that basis.
- (2) In addition to the modules Projects and Master's thesis, the Master's program consists of compulsory, compulsory optional and compulsory elective modules which are combined in module groups.
- (3) Subjects for the compulsory optional modules and the compulsory elective modules must be selected from catalogues provided in the module handbook.
- (4) Outside of the Master's thesis, the following forms of teaching will be applied: lecturers, exercises, seminars and projects.

#### Section 6 **Examinations and Examination Deadlines**

- (1) Except for the modules Projects and Master's thesis, a final module examination is a module final examination and may on a case-by-case basis consist of course-oriented partial examinations or several partial performances which will herein generally be called examination. Examinations are normally conducted as oral examinations or written exams. In addition, the examinations may take alternative forms such as written homework, term papers, projects, presentations or a colloquium.
- (2) In all cases the examinations must be suitable for individual evaluations. The examination forms and conditions for final examinations and part examinations of modules and for partial credits including registration and cancellation notice periods, as well as the conditions for repeating, must be established within the first three weeks of the term by the Examination Committee in consultation with the examiners and published in an appropriate form. Typically, this is done by an announcement in the module handbook or postings.
- (3) The examination in the Projects module normally consists of an assessment of the term paper, the final presentation, the final report and similar. Alternatively, an oral final examination may be conducted. Details of the examination in the Master's thesis module are given in Section 17 hereof.
- (4) With regard to examinations in the General Studies the provisions of these examination regulations shall apply to enrollment, cancellation, withdrawal, cheating, breach of rules, marking of examinations and allocation of credits.
- (5) If the candidate produces a medical certificate substantiating his or her inability to sit the whole or part of the examination in the scheduled form because of long-term or permanent physical

incapacity, the Chair of the Examination Committee shall ensure that the candidate is given an opportunity to take a reasonably equivalent examination in a different form.

- (6) All examinations are taken in conjunction with the university courses. Examinations typically take place twice during the academic year.

## Section 7 Types of Examinations

- (1) Except for the modules Projects and Master's thesis, a module examination is a module final examination and may on a case-by-case basis consist of course-oriented partial examinations or several partial performances which herein will generally be called examination. Examinations are normally conducted as oral examinations or written exams. Examinations may also take the form of presentations, term papers, written homework, projects and/or a colloquium.
- (2) The examination forms and conditions for final examinations and partial examinations of modules and for partial credits including registration and cancellation notice periods, as well as the conditions for repeating, must be established within the first three weeks of the term by the Examination Committee in consultation with the examiners and published in an appropriate form. Typically, this is done by an announcement in the module handbook or postings.
- (3) In the **oral examinations** the candidate is expected to demonstrate his or her understanding of the relationships within the area examined and to be able to categorize particular issues within these relationships and find solutions within a set time. Oral examinations are normally taken as group examinations or as individual examinations with two examiners (panel examination) or one examiner in the presence of an assessor (see Section 11 (1) hereof). In the case of the last repetition the evaluation is done by two examiners. Before determining the mark according to Section 14 (1) hereof, the examiners confer or the single examiner hears the assessor's remarks in the candidate's absence. The length of oral examinations depends on the number of credits for a module. An oral examination takes 20 to 30 minutes for a module with 5 credits and 30 to 45 minutes for a module with more than 5 credits. The time for group examinations may be extended appropriately. The main subject-matters and results of the examination are recorded in an examination protocol. The candidate is told the result of the examination after completion of the oral examination.
- (4) Unless a candidate objects, students wishing to take the same examination at a later date may be admitted as listeners, if space permits. Permission does not extend to deliberation and announcement of the examination result.
- (5) In a **written examination** the candidate is expected to demonstrate that he or she is able to recognize problems in the relevant subject area and solve them by standard methods within a set time using the resources permitted by the examiner. A list of permitted resources is issued at the same time as the announcement of the examination date. The length of a written examination is determined by the number of credits attached to the relevant classes. It is 60 to 120 minutes for classes with up to five credits and 120 to 240 minutes for classes with more than five credits.
- (6) Each written examination is marked by a single examiner within the meaning of Section 11 (21) hereof. In the case of the last repetition of an examination the work is marked by two examiners. Students are notified of the marking of written examinations within six weeks, generally in the course management system or by posting the results at the respective teaching and research units.
- (7) A **presentation** is a talk of at least 30 minutes but no more than 60 minutes based on a written elaboration. It is to show that students are able to work out a scientific subject taking into consideration the interconnection within the subject area and present the results orally.
- (8) In a **term paper**, students address a subject relevant to a specific course in an appropriate manner, utilizing relevant literature and resources, and present a qualified solution. The paper comprises about 10 DIN-A4 pages. A list of permitted resources is issued at the same time as the announcement of the assignment.
- (9) In a project students work independently, but with guidance, on a precisely defined scientific problem, documenting their work in writing.

- (10) Examinations according to paragraphs 8 and 9 may be admitted as group examinations, if an individual evaluation of the work of each group member is possible.
- (11) In a **colloquium**, students are to prove in a discussion of 20 to 30 minutes with the examiner and other participants of the colloquium that they are able to recognize/identify a subject-related context and place specific problems into this context. The colloquium may be started with a presentation according to paragraph 7.

#### Section 8

##### **Passing and Repeating Examinations**

- (1) An examination of a module is deemed passed if a mark of at least 'sufficient' (4.0) is awarded. A passed examination may not be repeated.
- (2) A failed examination which is a module final examination or a course-related partial examination may be repeated twice. The second repeat of a written examination is an oral examination. Regulations of Section 7 are applied accordingly.
- (3) A failed or passed examination of a compulsory optional subject may be dropped within the respective module group once if the repeat option has not been made use of.
- (4) A module examination is deemed definitely failed if the module final examination or a course-related partial examination within a module is definitely failed.
- (5) In addition to paragraph 1 the following applies to the General Studies: A failed module final examination or a failed course-related partial examination in the General Studies may be repeated or substituted by an examination relating to another course. Each module final examination or course-related partial examination may be repeated twice. The General Studies are deemed definitely failed if one examination has been definitely failed. In this case there is no possibility of substitutions.

#### Section 9

##### **Registration and Examination Deadlines**

- (1) Students have to register in the Paderborn Assistance System for University and Teaching (PAUL) or exceptional cases in writing at the Central Examination Secretariat for each module separately.

In order to register, the admission conditions according to Section 15 hereof must be fulfilled. Registrations for examinations according to Section 6 (1) have to be done in PAUL within the published deadlines.

- (2) Cancellation of registration for examinations can be done online or in writing at the Central Examination Secretariat ("Zentrales Prüfungssekretariat") without giving any reasons no later than one week before the respective examination date.

#### Section 10

##### **Examination Board**

- (1) The Faculty Council ("Fakultätsrat") of the Faculty of Electrical Engineering, Computer Science and Mathematics forms an Examination Committee ("Prüfungsausschuss") for the Master's program in Electrical Systems Engineering which is responsible for
- organizing and supervising examinations;
  - ensuring compliance with the examination regulations and observance of the rules of procedure adopted for conducting examinations;
  - decisions on objections to decisions taken in examination procedures;
  - drawing up an annual report to the Faculty Council on the progress of the examinations and the duration of study;
  - additional tasks expressly assigned to the Examination Board under these Regulations.

In addition, the Examination Board makes suggestions about the reform of the examination regulations and the study regulations and discloses the distribution of marks. The Examination Board

may delegate the handling of matters that are not of vital significance to the Chair; this does not apply to decisions on objections or reporting to the Faculty Council. The Chair reports to the Examination Board on decisions taken by the Chair alone.

- (2) The Examination Board consists of the Chair, the Deputy Chair and five other members. At the proposal of the respective group the Chair, the Deputy Chair and two other members from the group of university teachers, one member from the group of academic staff and two members from the group of students are elected by their respective representatives in the Faculty Council. Representatives and deputies for the members of the Examination Board other than for the Chair and the Deputy Chair are elected in correspondingly. The term of office for the members and deputies and representatives from the group of university teachers and academic staff is two years running from 1 October in the year of election to 30 September in the next-but-one year, thus corresponding to the Faculty Council election period. The term of office for the students is one year running from 1 October in the year of election to 30 September the following year. Re-election is permissible.
- (3) The Examination Board is a public authority within the meaning of the General Administrative Law and Law on Administrative Procedure.
- (4) The Examination Board has a quorum if in addition to the Chair or the Deputy Chair and two other university teachers at least one other member entitled to vote is present. The Examination Board takes decisions by a simple majority. In case of a tied vote the Chair has the casting vote. The student members of the Examination Board participate only in a consultant capacity on educational/academic decisions, in particular the assessment, recognition or crediting of studies and examinations, establishing of examination tasks and the appointment of examiners and assessors.
- (5) The Examination Board is convened by the Chair. A meeting must be convened when requested by at least three members.
- (6) The Examination Board meets *in camera*. The members of the Examination Board, their deputies, the examiners and the assessors shall maintain confidentiality. If they are not public servants they are placed under an obligation of secrecy by the Chair of the Examination Board.
- (7) The members of the Examination Board are entitled to be present during examinations.

#### Section 11

##### **Examiners and Assessors**

- (1) The Examination Board appoints the examiners and assessors. The Board may delegate this task to the Chair. Examiners are university professors, junior professors, lecturers not on the salaried university staff and university lecturers, habilitated assistant lecturers and habilitated academic staff. As a rule, academic staffs holding a doctorate who have taught independently in the corresponding subject in the study stage relevant to the examination are also appointed as examiners. Only persons who have successfully completed this or a related degree program at a scientific university within the jurisdiction of the German Basic Law or who hold a comparable degree are appointed as assessors.
- (2) Examiners are independent in their examining role.
- (3) The candidate may propose examiners for the Master's thesis and, if there is a choice of several examiners, for the oral examinations. The candidate's proposals are to be taken into consideration if possible. This does not constitute a claim, however.
- (4) The names of the examiners are posted in the Paderborn Assistance System for University and Teaching (PAUL).

#### Section 12

##### **Crediting of Periods of Study, Study Credits and Examinations, Placing in Higher Semesters**

- (1) Study periods, study performances and examinations in the same degree program at other universities within the jurisdiction of the German Basic Law are credited ex officio without an assessment of equivalence.



- (2) Study periods, study performances and examinations in other degree programs or at other universities as well as state or state-recognized universities of cooperative education within the jurisdiction of the German Basic Law are credited insofar as equivalence is established. Study periods, study performances and examinations at universities outside the jurisdiction of the German Basic Law are credited by request, provided that equivalence has been established. Equivalence according to clauses 1 and 2 is to be established if the study period, study performances and examinations essentially correspond to this degree program in terms of content, scope and requirements. This is based not on a schematic comparison but on an overall view and overall assessment. The equivalence agreements approved by the Standing Conference of the Ministers of Education and Cultural Affairs and the Standing Conference of University Rectors and agreements in the context of university partnerships are to be observed with regard to the equivalence of duration of study, study performances and examinations at foreign universities. Otherwise, in cases of doubt as to the equivalence the Central Office of Foreign Education may be consulted.
- (3) Unsuccessful attempts in equivalent module examinations in the same degree program at another university or related or comparable degree programs at this or another university in the jurisdiction of the German Basic Law are taken into account ex officio.
- (4) Paragraph 2 shall apply analogously to the crediting of the study period, study performances and examinations in accredited correspondence degree courses or in the correspondence degree course units developed by the State of North Rhine-Westphalia in cooperation with other states and the federal government.
- (5) Applicants entitled to enter the course in a higher semester on the basis of a placement exam according to HG Section 49 (12) are credited with the knowledge and skills demonstrated in the placement exam against the examination. The information in the placement exam certificate is binding upon the Examination Board.
- (6) The Examination Board is competent to decide on credits according to paragraphs 1 to 5. Competent faculty representatives are to be heard prior to making decisions on equivalence.
- (7) If study performances and examinations are credited the marks are transferred, if the marking systems are comparable, and after conversion included when calculating the overall mark. If the marking systems are not comparable the word "Pass" is entered. The credit is indicated on the certificate.
- (8) An examination can be credited only once. The students shall produce the documents needed for crediting (in particular those concerning class content and examination conditions, number of examination attempts and examination results).
- (9) Upon application other skills and qualifications may be credited on the basis of documents submitted.

### Section 13

#### **Absence, Withdrawal, Cheating, Breach of Rules, Protective Provisions**

- (1) An examination is deemed 'unsatisfactory' (5.0) if the candidate fails to appear for an examination without good reason or withdraws from the examination without good reason within the week preceding the examination concerned or after the start of the examination. The same shall apply if a written examination is not taken within the time allowed.
- (2) The reasons put forward for absence or withdrawal within the week preceding the examination concerned or after the start of the examination must be submitted to the Examination Board in writing without delay and at the latest within five working days from the examination date and must be substantiated. If a candidate is ill, a medical certificate must be provided containing an assessment of his or her unfitness to sit the examination or containing the information the Examination Board needs in order to establish the candidate's unfitness to sit the examination. This certificate must be dated no later than the date of the examination. The Examination Board may seek confirmation from the medical officer. The Examination Board shall notify the candidate in writing if it does not accept the reasons. If the reasons are accepted the examination results already obtained are credited.

- (3) If a candidate cheats or attempts to cheat the examination concerned is marked 'unsatisfactory' (5.0) or 'failed'. If a candidate takes a non-permitted resource into the examination the examination concerned may be assessed as 'unsatisfactory' (5.0) or 'failed'. The incidents are put on record by the respective invigilator. The action according to clause 1 hereof or the decisions according to clause 2 hereof is taken by the respective examiner.
- (4) Any candidate disturbing the orderly course of the examination may be excluded from taking the remainder of the examination by the respective examiner or invigilator, normally after a warning; in this case the examination concerned is considered 'unsatisfactory' (5.0) or as 'failed'. The reasons for exclusion are put on record.
- (5) Within 14 days the candidate may ask for decisions according to paragraphs 3 or 4 to be reviewed by the Examination Board. Incriminating decisions are to be accompanied by advice of legal remedies available.
- (6) In serious cases the Examination Board may exclude the candidate from taking any further examinations. Acts of cheating may also be punished by a fine of up to € 50,000 according to Section 63 (5) of the HG and may lead to removal from the university.
- (7) Upon application by a candidate maternity leave as established in the legislation current at the time to protect working mothers (Maternity Protection Act, MSchG) is taken into account accordingly. The necessary proof must be enclosed with the application. Any time periods in accordance with these examination regulations are interrupted by the maternity leave; the duration of the maternity leave is not counted as part of such time periods.
- (8) On application the periods of extended parental leave according to the legislation on granting of child benefit and extended leave (Federal Child-Raising Allowance Act, BEEG) current at the time are likewise taken into account. The candidate must notify the Examination Board in writing no later than four weeks before the date when he or she wishes the extended parental leave to start, enclosing the necessary proof of the period or periods for which he or she wishes to take extended parental leave. The Examination Board shall then check whether the statutory requirements are fulfilled that would entitle an employee to extended parental leave under the BEEG and shall notify the candidate without delay of the outcome and the new examination dates, if applicable. The time for completing a scientific assignment cannot be interrupted by extended parental leave. The paper concerned is deemed not assigned. At the end of the extended parental leave the candidate is assigned a new topic.
- (9) The Examination Board also establishes the compensation for disadvantages of disabled students and takes into account absences due to caring for a spouse, a registered partner or an immediate relative or first-degree relative by marriage.

#### Section 14

#### **Marking of Examinations and Marking Structure**

- (1) Individual examinations are marked as follows:

1 = very good	an excellent performance
2 = good	a performance significantly above the average requirements
3 = satisfactory	a performance that meets the average requirements
4 = sufficient	a performance which meets the requirements despite its deficiencies
5 = unsatisfactory	a performance that no longer meets the requirements because of significant deficiencies

The following range of marks is available to differentiate the marking of final marks or part examinations: 1.0; 1.3; 1.7; 2.0; 2.3; 2.7; 3.0; 3.3; 3.7; 4.0 and 5.0.

- (2) The module mark for an examination consisting of partial credits is made up of a weighted average of the individual marks. If an examination is marked by more than one examiner, the mark is formed of the arithmetic mean of the marks awarded by the individual examiners. Only the first decimal point is taken into account in the calculation; all other decimal places are deleted without rounding up or

down.

The results thus calculated shall correspond to the following marks:

1.0 to 1.5 = very good

1.6 to 2.5 = good

2.6 to 3.5 = satisfactory

3.6 to 4.0 = sufficient

4.1 to 5.0 = unsatisfactory

- (3) Each module is marked with a module mark determined according to paragraphs 1 and 2 herein above.

## II. Master's Examination

### Section 15

#### Admission to Master's Examination

- (1) Only students enrolled in the Master's program in Electrical Systems Engineering at the University of Paderborn or admitted as visiting students ("Zweithörer(in)") according to Section 52 (2) HG may be admitted to the Master's examination.
- (2) Prior to beginning work on the Master's thesis, module examinations comprising 45 credits have to be passed successfully.
- (3) Students transferring from another university or degree program who have failed a subject in a study program according to paragraph 3 (5), lit. c) a past examination of which is required for the Master's program Electrical Systems Engineering according to Section 16 and which has to be regarded as equivalent can only be admitted to the respective repeat examination.

### Section 16

#### Aim, Scope and Nature of Master's Examination

- (1) In the Master's examination the candidate is expected to demonstrate that he or she has acquired scientific knowledge and skills in the subject of Electrical Systems Engineering and is thus able to carry out scientific work independently.
- (2) The Master's examination is taken in one of two specializations, namely 'Signal and Information Processing' and 'Electronics and Devices'. The choice of specialization is made no later than at enrollment in the first module in which the two specializations differ.
- (3) If the candidate decides to change her / his specialization, he / she has to submit a request in writing to the Examination Board. Examinations already passed will be credited as far as possible.
- (4) The Master's examination consists of the following course-accompanying module examinations:
- a) Compulsory module *Advanced System Theory* from the module group *Introduction to Electrical Systems Engineering* with 6 credits,
  - b) Compulsory module *Modeling & Simulation* from the module group *Introduction to Electrical Systems Engineering* with 6 credits,
  - c) When selecting the specialization *Signal & Information Processing*:
    - i. Compulsory module *Statistical Signals* from the module group *Introduction to Electrical Systems Engineering* with 6 credits,
    - ii. Compulsory module *Statistical Learning & Pattern Recognition* from the module group *Introduction to Electrical Systems Engineering* with 6 credits,

or

when selecting the specialization *Electronics & Devices*:

- iii. Compulsory module *Fields & Waves* from the module group *Introduction to Electronics & Devices* with 6 credits,
- iv. Compulsory module *Circuit System Design* from the module group *Introduction to Electronics & Devices* with 6 credits,
- d) Compulsory module *Management of Technical Projects* from the module group *Management and Application* with 3 credits,
- e) Compulsory module *Topics in Systems Engineering* from the module group *Management and Application* with 3 credits,
- f) 2 compulsory optional modules from the module group *Fundamentals of Electrical Systems Engineering* with 6 credits each,
- g) 2 compulsory optional modules from the module group *Signal and Information Processing*

or

2 compulsory optional modules from the module group *Electronics and Devices*

with 6 credits each

- h) 2 compulsory elective modules from the module group *Electrical Systems Engineering* with 6 credits each:  
  
2 subjects from all the courses offered in the degree program “Electrical Systems Engineering” as far as they are not credited to other modules
- i) 2 compulsory elective modules *General Studies* with 3 credits each:  
  
subjects according to Section 4 (6),
- j) 1 compulsory elective module *Projects* with 18 credits for a year-long project or 2 compulsory elective modules *Projects* with 9 credits for two six-months projects,
- k) module *Master’s thesis* (“*Masterarbeit*”) with 30 credits.

- (5) The catalogues of compulsory elective modules and compulsory optional modules are published on the website of the Institute of Electrical Engineering and Information Technology by the Examination Board at the beginning of a semester. The Examination Board may allow a different subject on a case-by-case basis by request. In this case the Examination Board will determine the examinations to be taken and inform the applicant accordingly. As a result of on-going development of the research and teaching contents of the Institute a small number of compulsory optional courses may be cancelled from the module list or be substituted or supplemented by courses that technically are part of the same catalogue. Changes will be announced in the module handbook. Regulations regarding examinations and the scope are unaffected by this. The catalogues of compulsory elective modules and compulsory optional modules including more specific regulations of the form of examinations are in the addendum of these examination regulations.
- (6) Additional examinations on subjects from all the classes offered in the degree program Electrical Systems Engineering and also, on other subjects by request may be taken as additional examinations provided they are not credited to other modules. The marks for these are not included in the overall mark according to Section 20 (2) hereof.

- (1) The Master's thesis is an examination which completes the scientific training and is intended to demonstrate the candidate's ability to work on an electrical engineering problem within a set time using scientific methods. The work must be completed within six months and is valued at 30 credits. The scope of the written work should allow an appropriate description of the subject of the Master's thesis, the results achieved and their classification in the state of science.
- (2) The Master's thesis may be assigned and supervised by any examiner according to Section 11 (1) hereof. The candidate must be given the opportunity to submit proposals for the topic of the Master's thesis. Such proposals do not constitute a claim.
- (3) On request, the Chair of the Examination Board ensures that a candidate receives a topic for her / his Master's thesis in good time.
- (4) The Master's thesis may also be permitted as a group project if the individual candidate's contribution to be marked as an examination is clearly distinguishable and markable on the basis of the sections, page numbers or other objective criteria allowing a clear delimitation and if the requirements of paragraph 1 herein above are fulfilled.
- (5) The candidate has to register her / his Master's thesis at the Central Examination Secretariat in writing.
- (6) The Master's thesis cannot be started until module examinations amounting to 60 credits have been successfully completed. The topic of the Master's thesis is allocated by the Chair of the Examination Board. The date of allocation is put on record by the Central Examination Secretariat.
- (7) The candidate will be notified in writing of the topic and the problem definition of the Master's thesis. These must be such that the thesis can be completed within the allocated processing time. The topic may be declined only once and only within the first month of allocation. The processing time shall start afresh with the assignment of the new topic. The Examination Board may extend the processing time by up to six weeks on a substantiated request on an individual basis.
- (8) In case of illness the deadline for submitting the Master's thesis may be extended by a maximum of two weeks upon request by the candidate. A medical certificate has to be submitted. The examination Board will inform the candidate in writing if it accepts the reasons of illness. The same applies to non-recognition of the reasons put forward. The extension granted in case of recognition corresponds to the time of illness; it has no effect regarding an extension of the standard length of study. If the illness exceeds two weeks, the candidate will be assigned a new topic.
- (9) The Master's thesis must not have been prepared in whole or in parts for another examination in the same or another degree program.
- (10) When submitting the Master's thesis the candidate shall declare in writing that it – or, in the case of a group project, the part of the work labelled accordingly – is his or her own work and that no resources other than those indicated have been used and that all quotations have been shown as such.
- (11) Not later than four weeks after submitting the Master's thesis a presentation of the topic of the Master's thesis and its results is given. The presentation of the topic of the Master's thesis and the results takes approximately 30 to 45 minutes.

#### Section 18

#### **Acceptance and Evaluation of Master Thesis**

- (1) The Master's thesis is delivered to the Examination Board on time and to that end is handed in to the Central Examination Secretariat. The date of handing in is put on record. Two copies of the thesis must be submitted. If sending the thesis by mail, the postmark shall apply. A Master's thesis not submitted in time is marked 'unsatisfactory' (5.0).
- (2) The Master's thesis is marked by two examiners according to Section 11 hereof. One of the examiners has to be a full-time professor of electrical engineering. The student's presentation and the scientific discussion are included in the marking. The mark is the arithmetic mean of the marks awarded by the two examiners or by the examiner and the assessor if the difference is less than 2.0.

If the markings of the first and second assessment differ by a value of 2.0 or more, the Chair of the Examination Board shall provide a third assessment. The mark for the Master's thesis is then the arithmetic mean of the three assessments. However, the Master's thesis may be marked 'sufficient' (4.0) or higher only if at least two of the marks are 'sufficient' (4.0) or higher.

- (3) The student is to be informed of the mark awarded to the Master's thesis within six weeks of submitting the work.

#### Section 19

##### **Resit of Master Thesis**

- (1) The Master's thesis may be repeated once if the mark is insufficient (less than 4.0). A second repetition is not permitted. The Master's thesis topic may be declined within the time period given in Section 17 (7) clause 3 hereof only if the candidate did not avail himself or herself of that opportunity when preparing his or her first Master's thesis.
- (2) The candidate may propose a different examiner for the repetition of the Master's thesis.

#### Section 20

##### **Passing the Master's Examination, Overall Grade, Definite Failure**

- (1) The Master's examination is deemed passed if all the module examinations according to Section 16 hereof have been passed with a mark of at least 'sufficient' (4.0).
- (2) The overall mark is calculated from the average of the marks for the module examinations, weighted according to the credits, including the Master's thesis. Marks for the General Studies courses are not included in the overall mark.
- (3) The overall assessment 'passed with distinction' is given if the mark for the Master's thesis is 1.0, the average of the marks from the module examinations, weighted according to the credits, is at least 1.3 and none of the module marks relevant to the final grade is less than 'good'.
- (4) The Master's examination is definitely failed if one module examination is definitely failed or if the Master's thesis is awarded a mark less than 'sufficient' (4.0) for the second time.
- (5) The Chair of the Examination Board informs the candidate in writing if the Master's examination is definitely failed. The notice of failing the Master's examination is accompanied by advice of legal remedies available.
- (6) If a candidate has definitely failed the Master's examination, he or she will be issued a written certificate upon request with details of the examinations passed, incl. credits (ECTS-credits), and the marks obtained and clearly stating that the candidate has definitely failed the Master's examination.
- (7) Within one year of removal from the university register students have to be issued a certificate on request, stating the examinations passed and the number of examination attempts used for failed examinations.

#### Section 21

##### **Certificate, Transcript of Records and Diploma Supplement**

- (1) If the candidate has successfully completed the degree program, he or she will receive a certificate containing the name of the degree program, the specialization chosen, the standard period of study and the overall grade. The certificate is dated with the date of the last examination and, next to it the date of issue. The certificate is signed by the Chair of the Examination Board. The certificate is written in English.
- (2) Furthermore, the candidate receives a Transcript of Records listing all of his / her successfully completed examinations and the length of his / her professional studies. The Transcript of Records includes information on credits (ECTS) and the grades awarded in the passed modules and for the Master's thesis. It also includes the topic of the Master's thesis and the final grade of the Master's examination.

- (3) Along with the leaving certificate, the graduate is handed a Diploma Supplement.
- (4) The Diploma Supplement is an addendum to the leaving certificate in English and German containing uniform information on German university degrees, explaining the German education system and a classification of the degree at hand. The Diploma Supplement informs about the completed degree program and the academic and professional qualifications obtained with this degree.
- (5)

#### Section 22

#### **Master's Degree Certificate**

- (1) Along with the certificate of the passed Master's examinations the candidate shall receive the Master's Degree certificate which provides a record of the conferring of the Master's degree according to Section 1.
- (2) The Master's Certificate is written in English.
- (3) The Master's Certificate is signed by the Dean of the Faculty and by the Chair of the Examination Board and bears the official seal of the University of Paderborn.

### **III. Final Provisions**

#### Section 23

#### **Invalidity of Master's Examination**

- (1) If a candidate has cheated in an examination and this is only discovered after the certificate has been issued, the Examination Board may a posteriori adjust the marks for the examinations in which the candidate cheated and declare the examination wholly or partly failed.
- (2) If the conditions of admission to an examination were not fulfilled without any deceitful intent on the candidate's part, and if this is only discovered after issue of the certificate, this deficiency is remedied by passing the examination. If the candidate has intentionally and wrongfully obtained admission, the Examination Board shall decide on the legal consequences with regard to the Administrative Proceedings Act of the State of North Rhine-Westphalia.
- (3) The person concerned has to be given an opportunity to make a statement before a decision is made.
- (4) The incorrect certificate is withdrawn and a new one issued if appropriate. Any decision according to paragraph 1 and paragraph 2 clause 2 herein above has to be made within five years from issue of the examination certificate.
- (5) If the examination as a whole is declared failed, the Master's degree is nullified and the relevant certificate withdrawn.

#### Section 24

#### **Nullifying of Master's Degree**

The Master's degree is nullified if it a posteriori turns out that it was gained by cheating or if essential conditions for its award were mistakenly considered to be fulfilled. The nullification decision is taken by the Faculty Council with two-thirds of its members.

Section 25

**Inspection of Examination Records**

- (1) Upon completion of every examination and the examination procedure the candidate may by request inspect his or her written examination papers, the examiners' relevant remarks and the minutes of the examination.
- (2) The application is made to the Chair of the Examination Board within one month from announcement of the results or issue of the examination certificate. The Chair of the Examination Board decides on the place and date of inspection.

Section 26

**Effective Date and Publication**

- (1) These examination regulations come into force as of October 01, 2011.
- (2) These examination regulations are published in the Official Notices of the University of Paderborn (AM Uni. Pb.).

Issued on the basis of the decision of the Faculty Council of the Faculty of Electrical Engineering, Computer Science and Mathematics dated March 26, 2012 and the legality check by the Executive Board on April 25, 2012.

Paderborn, April 30, 2012

President  
of the University of Paderborn  
University Professor Dr. Nikolaus Risch



## Addendum: Module lists

Module lists within module groups to the extent that they have not been named in Section 16 (4).

Due to on-going development in the research and teaching contents of the Institute, a small number of courses listed on the module list may either be dropped from the compulsory elective and the compulsory optional courses or be substituted or supplemented by courses technically belonging to the same module group. Any changes will be announced in the module handbook. Regulations concerning performances / examination and scope remain unaffected by this.

### **Module group *Fundamentals of Electrical Systems Engineering***

- Introduction to Algorithms
- Digital Signal Processing
- High-Frequency Engineering
- Mechatronics and Electrical Drives
- Software Engineering

### **Module group *Signal and Information Processing***

- Advanced Topics in Robotics
- Algorithms and Tools for Test and Diagnosis of Systems on a Chip
- Cognitive Systems Engineering – Special Topics
- Cognitive Systems in Virtual Reality – Modeling and Simulation
- Digital Image Processing I
- Digital Image Processing II
- Knowledge Engineering
- Optimal and Adaptive Filters
- Rescue Robot Systems
- Robotics
- Signal Processing for Wireless Communications
- Simulation of Electromagnetic Fields
- Topics in Signal Processing
- Wireless Communications

### **Module group *Electronics and Devices***

- Analog CMOS ICs
- Controlled AC Drives
- High-Frequency Electronics
- Micro-Electromechanical Systems
- Optical Communication A
- Optical Communication B
- Optical Communication C
- Optical Communication D
- Power Electronics

- Processing of Semiconductors
- Radio Frequency Power Amplifiers
- Sensor Technology
- System Packaging
- VLSI Testing

All these modules are compulsory optional modules carrying 6 credits.

The following performances / examinations are required:

- 1 written examination or
- 1 oral examination or
- 1 presentation or
- 1 written term paper or
- 1 written homework or
- 1 project

for each course.