Preamble to the Module Handbook

Master's Program
Electrical Systems Engineering

University of Paderborn

Faculty of Electrical Engineering, Computer Science and Mathematics

Department of Electrical Engineering and Information Technology

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1 General Remarks

1.1 Overview of Course Program

The Master's program Electrical Systems Engineering (MS ESE) at the University of Paderborn provides students with a solid background in the theory and the fundamental concepts of electrical systems design. It gives insights into current trends and developments and ample opportunities for practical experience. Upon completion of the MS ESE, students are awarded a *Master of Science in Electrical Systems Engineering*.

Table 1 shows the design of the master's program. In the first semester fundamentals are being taught and the students will start to fill individual gaps. The chosen specialization will be started in the first three semesters and will be consolidated by modules in the third semester. Starting in the second semester the students realize one or two projects in teams where each project shall incorporate hardware as well software engineering techniques and furthermore scientific approaches for advanced electrical systems. The program will be completed by modules dealing with soft skills. The fourth semester is reserved for the Master thesis. When finishing the program the students are able to develop independently solutions for complex problems.

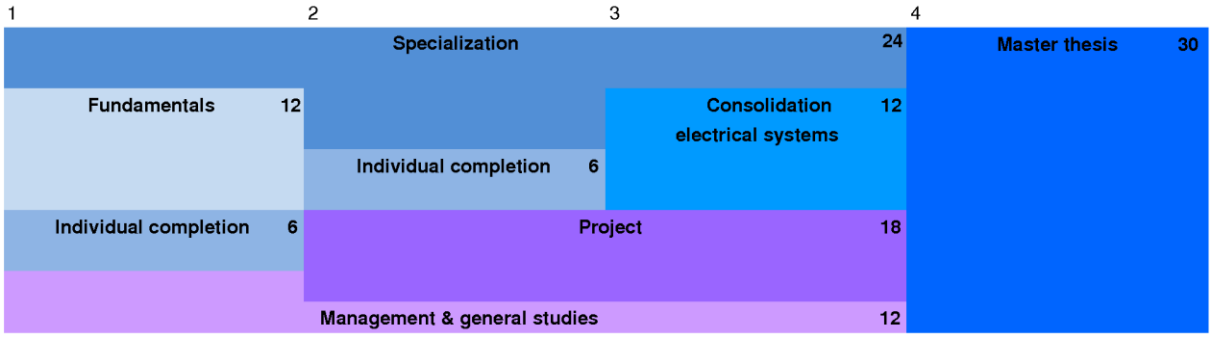

Table 1: Design of Master's Program

As can be seen from **Table 2**, the Master's program consists of six compulsory modules (30 credit points), four compulsory elective modules (24 CP) and two elective modules (12 CP), totaling 66 credit points. The degree plan is complemented with general studies (6 CP), one one-year project or two half-year projects (18 CP) and the Master's thesis (30 CP). This gives a total of 120 CP.

Four modules are specific to the selected specialization, be it S&IP or E&D. The compulsory elective or elective modules of the selected specializations are listed in catalogs from which the students may choose their courses:

- Module group S&IP: Modules in the field of signal and information processing
- Module group E&D: Modules in the field of electronics and devices

or the students may choose compulsory modules from the other specialization.

A more detailed overview of the degree plan is given in **Table 3** and **Table 4**. They show the distribution of the modules over the four semesters. Related modules are depicted in the same color.

Module Group	**Modules**	**CP**
Introduction to Electrical Systems Engineering (Compulsory)	Advanced System Theory	6
	Modeling and Simulation	6
Introduction to Signal & Information Processing *or* Introduction to Electronics & Devices (Compulsory)	Introduction to S&IP: • Statistical Signal Processing • Statistical and Machine Learning	12
	Introduction to E&D: • Fields and Waves • Circuit & System Design	12
Management and Application (Compulsory)	• Management of Technical Systems • Topics in Systems Engineering	6
Fundamentals of Electrical Systems Engineering (Compulsory elective)	2 modules from the module group	12
Signal & Information Processing *or* Electronics & Devices (Compulsory elective)	2 modules from the module groups S&IP or E&D depending on selected specialization	12
Electrical Systems Engineering (Elective)	2 modules from all modules offered in the Master's program if not used already	12
Projects	1 two-semester or 2 one-semester projects	18
General Studies	2 modules	6
Master's thesis		30
Total		120

Table 2: Overview of modules

MS Electrical Systems Engineering Specialization: Signal & Information Processing				
1. Semester 20 SWS, 30 CP	2. Semester 20 SWS, 30 CP	3. Semester 20 SWS, 30 CP	4.Semester 30 CP
Introduction to ESE *Compulsory subject* **Advanced System Theory** (4 SWS, 6 CP)	Intro. to Signal & Info. Processing *Compulsory subject S&IP* **Statistical and Machine Learning** (4 SWS, 6 CP)	Signal & Information Processing *Compulsory elective* (4 SWS, 6 CP)	**Master Thesis**
Introduction to ESE *Compulsory subject* **Modeling & Simulation** (4 SWS, 6 CP)	Signal & Information Processing *Compulsory elective* (4 SWS, 6 CP)	Electrical Systems Engineering *Elective* (4 SWS, 6 CP)	
Intro. to Signal & Info. Processing *Compulsory subject S&IP* **Statistical Signal Processing** (4 SWS, 6 CP)	Fundamentals of ESE *Compulsory elective* (4 SWS, 6 CP)	Electrical Systems Engineering *Elective* (4 SWS, 6 CP)	
Fundamentals of ESE *Compulsory elective* (4 SWS, 6 CP)			
Management and Application *Compulsory subject* **Management of Technical Projects** (2 SWS, 3 CP)	Projects *Elective* **Analysis/ Design** (6 SWS, 9 CP)	Projects *Elective* **Realization/ Test** (6 SWS, 9 CP)	
General Studies *Elective* **Language Course German or Other** (2 SWS, 3 CP)	General Studies *Elective* **Language Course German or Other** (2 SWS, 3 CP)	Management and Application *Compulsory seminar* **Topics in Systems Engineering** (2 SWS, 3 CP)	(30 CP)
Abbreviations: SWS: Hours per week CP: ECTS credits			01.02.2018

Table 3: Degree plan for the “Signal & Information Processing” specialization

Table 4: Degree plan for the "Electronics & Devices" Specialization

MS Electrical Systems Engineering Specialization: **Electronics & Devices**			
1. Semester 20 SWS, 30 CP	2. Semester 20 SWS, 30 CP	3. Semester 20 SWS, 30 CP	4.Semester 30 CP
Introduction to ESE *Compulsory subject* **Advanced System Theory** (4 SWS, 6 CP)	Intro. to Electronics & Devices *Compulsory subject E&D* **Fields & Waves** (4 SWS, 6 CP)	Electronics & Devices *Compulsory elective* (4 SWS, 6 CP)	**Master Thesis** (30 CP)
Introduction to ESE *Compulsory subject* **Modeling & Simulation** (4 SWS, 6 CP)	Electronics & Devices *Compulsory elective* (4 SWS, 6 CP)	Electrical Systems Engineering *Elective* (4 SWS, 6 CP)	
Intro. to Electronics & Devices *Compulsory subject E&D* **Circuit & System Design** (4 SWS, 6 CP)	Fundamentals of ESE *Compulsory elective* (4 SWS, 6 CP)	Electrical Systems Engineering *Elective* (4 SWS, 6 CP)	
Fundamentals of ESE *Compulsory elective* (4 SWS, 6 CP)			
Management and Application *Compulsory subject* **Management of Technical Projects** (2 SWS, 3 CP)	Projects *Elective* **Analysis/ Design** (6 SWS, 9 CP)	Projects *Elective* **Realization/ Test** (6 SWS, 9 CP)	
General Studies *Elective* **Language Course German or Other** (2 SWS, 3 CP)	General Studies *Elective* **Language Course German or Other** (2 SWS, 3 CP)	Management and Application *Compulsory seminar* **Topics in Systems Engineering** (2 SWS, 3 CP)	
Abbreviations: SWS: Hours per week CP: ECTS credits			01.02.2018

1.2 Purpose of Module Handbook

The module descriptions in this manual

- describe the goals, contents and interdependencies between the modules offered in the degree plan,
- offer students useful and mandatory information to plan their individual degree plan,
- provide teaching staff and others with an in-depth view of the contents and methodological organization of the course program

1.3 Schema of Module Descriptions

The module descriptions are given in a standardized scheme. Wherever possible, information is given both in German and English.

Each module is described in tabular form containing the following topics

- A block with the key data of the module:
    - Koordinator / *Coordinator:*
      Name of teacher.
    - Lehr- und Forschungseinheit / *Teaching unit*:
      Name of research group offering the module.
    - Typ / *Type*:
      Type of module offered (e. g. lecture, exercise, seminar, …).
    - Arbeitspensum / *Workload*
    - Leistungspunkte / *Credits*:
      Number of ECTS credit points allocated to the module.
    - Modulseite / *Module Homepage*:
      Link to a web site containing information about the module.
    - Zeitmodus / *Semester*:
      Information about when the module is offered (e. g. winter or summer semester).
- Kurzbeschreibung / *Short Description*:
  Short description of the contents and goals of the course.
- Inhalt / *Contents*:
  More detailed description of the module contents.
- Lernergebnisse und Kompetenzen / *Learning outcomes and competences*
- Methodische Umsetzung / *Implementation*:
  Comments on the methodological concept.
- Inhaltliche Voraussetzungen / *Prerequisites*:
  Information about which modules should have been successfully attended or which competences acquired before entering the module under description. All prerequisites are recommendations.

- Kombinationshinweise – Überschneidungen / *Related and overlapping modules*:
  Information about preferable combination or overlap with other courses.
- Prüfungsmodalitäten / *Assessments*:
  Klausur, mündliche Prüfung, Vortrag, schriftliche Ausarbeitung oder andere Prüfungsform / Written or oral exam, oral presentation, written report or other assessments
- Unterrichtssprache / *Teaching Language*
- Lehrmaterialien, Literaturangaben / *Teaching Material, Literature*

1.4 Examinations

All modules will be completed by an exam.

In the Master's program there exist different forms of assessments (written or oral exam, oral presentation, written report or other assessments). The assessments are offered directly after the end of the module. Credits will only be granted if the entire module is completed successfully.

The duration of a written exam depends on the number of credits for the respective course. It will last 60 to 120 minutes for a module with up to 5 credits and 120 to 240 minutes for a module with more than 5 credits.

Similarly, an oral examination will last 20 to 30 minutes for a module with up to 5 credits and 30 to 45 minutes for a module with more than 5 credits.

The dates for written exams will be published within the first three weeks of the lecture period, while the oral exams will be arranged individually between professor and student. If a written or an oral exam is possible, the examination board will announce within the first three weeks of the lecture period which type of examination will be offered at the end of a module.

1.5 List of Abbreviations

CP	Credit Point
ECTS	European Credit Transfer System
SWS	Semester load (weekly hours) / credit hours (Semesterwochenstunden)
2L *or* 2V	Lecture (*Vorlesung*) with 2 SWS (10 – 150 participants)
2Ex *or* 2Ü	Exercise (*Übung*) with 2 SWS (15 – 25 participants)
WS	Winter semester
SS	Summer semester
2P	Project with 2 SWS
2PS	Project seminar with 2 SWS
2S	Seminar with 2 SWS
S&IP	Signal and Information Processing
E&D	Electronics and Devices