

Dep. of Electrical Engineering and Information Technology Course-Management Electrical Engineering (LVM ET)

Preamble to the Module Handbook

Master's Program Electrical Systems Engineering v3 (ESEMA v3) Master-Version v3 (2024) (Study period: 4 Semester)

Faculty of Electrical Engineering, Computer Science and Mathematics Paderborn University

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2 General Remarks

2.1 Overview of Course Program

The Master's program Electrical Systems Engineering (MS ESE or ESEMA) 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.

1. Semester	2. Semester	3. Semester		4. Semester
		24		
Fundamentals 12	Invidual completion 6	Consolidation electrical systems	12	Master thesis 24
Individual completion 6	Project		18	
	Management & general studies 12		12	

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.

2.2 Module Groups

Module Group	Modules	СР
Introduction to Electrical Systems	Advanced System Theory	6
Engineering	Modeling and Simulation	6
(Compulsory)		
Introduction to Signal &	Introduction to S&IP:	15
Information Processing	Statistical Signal Processing	
or	Statistical and Machine Learning	
Introduction to Electronics &	Introduction to E&D:	15
Devices	Analysis and Design of Electronic Circuits	
(Compulsory)	Electromagnetic Waves and Waveguides	
Management and Application	Management of Technical Systems	6
(Compulsory)	Topics in Systems Engineering	
Fundamentals of Electrical	1 module from the module group	6
Systems Engineering		
(Compulsory elective)		
Signal & Information Processing or	2 modules from the module groups S&IP or E&D	12
Electronics & Devices	depending on selected specialization	
(Compulsory elective)		
Electrical Systems Engineering	2 modules from all modules offered in the Mas-	12
(Elective)	ter's program if not used already	
Projects	1 two-semester or 2 one-semester projects	18
General Studies		9
Master's thesis		30
	Total:	120

Table 2: Overview of modules

2.3 Degree Plan

2.3.1 Degree Plan for Specialization "Signal & Information Processing"

MS Electrical Systems Engineering				
Specialization: Signal & Information Processing				
1. Semester	2. Semester	3. Semester	4.Semester	
20 SWS, 30 CP	20 SWS, 30 CP	20 SWS, 30 CP	30 CP	
Introduction to ESE	Intro. to Signal & Info. Processing	Signal & Information Processing	Master Thesis	
Compulsory subject Compulsory subject S&IP		Compulsory elective		
Advanced System Theory	Statistical and Machine Learning			
(4 SWS, 6 CP)	(6 SWS, 9 CP)	(4 SWS, 6 CP)		
Introduction to ESE	Signal & Information Processing	Electrical Systems Engineering		
Compulsory subject	Compulsory elective	Elective		
Modeling & Simulation				
(4 SWS, 6 CP)	(4 SWS, 6 CP)	(4 SWS, 6 CP)		
Intro. to Signal & Info. Processing		Electrical Systems Engineering		
Compulsory subject S&IP		Elective		
Statistical Signal Processing				
(4 SWS, 6 CP)		(4 SWS, 6 CP)		
Fundamentals of ESE				
Compulsory elective				
(4 SWS, 6 CP)				
Management and Application	Projects	Projects		
Compulsory subject	Elective	Elective		
Management of Technical Projects				
	(6 SWS, 9 CP)	(6 SWS, 9 CP)		
(2 SWS, 3 CP)	(2 x 6 SV	VS, 18 CP)		
General Studies	General Studies	Management and Application		
Elective	Elective	Compulsory seminar		
Language Course German or Other	Language Course German or Other	Topics in Systems Engineering		
(2 SWS, 3 CP)	(2 SWS, 6 CP)	(2 SWS, 3 CP)	(30 CP)	
Abbreviations: SWS: Hours per week				
CP: ECTS credits				

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

2.3.2 Degree Plan for Specialization "Electronics & Devices"

MS Electrical Systems Engineering				
Specialization: Electronics & Devices				
1. Semester	2. Semester	3. Semester	4.Semester	
20 SWS, 30 CP	20 SWS, 30 CP	20 SWS, 30 CP	30 CP	
Introduction to ESE	Intro. to Electronics & Devices	Electronics & Devices	Master Thesis	
Compulsory subject	Compulsory subject E&D	Compulsory elective		
Advanced System Theory	Electromagnetic Waves and			
Advanced System meory	Waveguides			
(4 SWS, 6 CP)	(6 SWS, 9 CP)	(4 SWS, 6 CP)		
Introduction to ESE	Electronics & Devices	Electrical Systems Engineering		
Compulsory subject	Compulsory elective	Elective		
Modeling & Simulation				
(4 SWS, 6 CP)	(4 SWS, 6 CP)	(4 SWS, 6 CP)		
Intro. to Electronics & Devices		Electrical Systems Engineering		
Compulsory subject E&D		Elective		
Analysis and Design of Electronic				
Circuits				
(4 SWS 6 CP)		(4 SWS 6 CP)		
Fundamentals of ESE				
Compulsory elective				
(4 SWS, 6 CP)				
Management and Application	Projects	Projects		
Compulsory subject	Elective	Elective		
Management of Technical Projects				
	(6 SWS, 9 CP)	(6 SWS, 9 CP)		
(2 SWS, 3 CP)	(2 x 6 SV			
General Studies	General Studies Management and Application			
Elective	tive Elective Compulsory seminar			
Language Course German or Other	Language Course German or Other	Topics in Systems Engineering		
(2 SIM(S - 2 CD)		(2 SW(S 2 CD)	(20 CD)	
(2 SVVS, 3 CP)		(2 3 VV 3, 3 CP)	(50 CP)	
Abbreviations:	Abbreviations. SWS: Hours per week			
CP: ECIS credits				

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

2.4 **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

2.5 Schema of Module Descriptions

The module descriptions are given in a standardized scheme. It can be possible that the information is given both in German and English.

Module name				
Module number M.xxx.xxx	Workload (h)	Credits	Regular cycle	
Language	Semester number	Duration (in sem.)	Module status (C/CE)	
1 Module structure	2			
Course number Cou	urse name: Type with SV	VS (Time of attendance	e (h) / Self-study (h) / Status / Group size)	
2 Options within th	e module			
3 Admission require	ements			
4 Contents				
Short Description				
Contents				
5 Learning outcome	es and competences			
6 Assessments				
7 Study achievement				
8 Prerequisites for participation in examinations				
9 Prerequisites for assigning credits				
10 Weighing for ov	erall grade			
11 Reuse in degree courses or degree course versions				
12 Module coordinator				
13 Other notes				
Module Homepage				
Implementation				
Teaching Material, Literature				
Comments				

2.6 Examinations¹

All modules will be completed by an exam.

¹ The latest examination regulations and explanations can be found at

 $[\]underline{https://ei.uni-paderborn.de/en/studies/formalities/examination-regulations-and-module-manuals}$

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.

LP:	Leistungspunkte	СР	Credit Point
SWS	Semesterwochenstunden	SWS	Semester load (weekly hours)
2V	Vorlesung mit 2 SWS	2L	Lecture (Vorlesung) with 2 SWS
2Ü	Übung mit 2 SWS	2Ex	Exercise (Übung) with 2 SWS
WS	Wintersemester	WS	Winter semester
SS	Sommersemester	SS	Summer semester
2P	Projekt mit 2 SWS	2P	Project with 2 SWS
2S	Seminar mit 2 SWS	25	Seminar with 2 SWS
Р	Pflicht	С	Compulsory
WP	Wahlpflicht	CE	Compulsory elective

2.7 List of Abbreviations