

§ 48 Bachelor Study Program E-Mobility and Green Energy

(1) Structure of the Study Program

The Bachelor study program E-Mobility and Green Energy comprises the basic study period with a duration of two semesters and the main study period which concludes with **the Bachelor's** examination in the 7th semester.

It is possible to graduate this study program including a German vocational training. For detailed regulations see section 7.

For a successful graduation, a practical semester and academic courses worth 180 ECTS are required. The total number of 210 ECTS is made up of six theoretical semesters with 30 ECTS each and one practical semester worth 30 ECTS.

German speaking students, who start in the summer semester, have to chose Englisch in the language module.

(2) Courses

The lectures for students of the english study program will be given in english on a yearly basis, exceptions can be decided by the faculty board (according: General part of the SPO §3.3). The lectures from semester six and seven will be given in german, exceptions can be decided by the faculty board (according: General part of the SPO §3.3). Subjects from a study focus (Table 3) can be offered in english without the approval of the faculty board.

All courses comprise a proportion of exercises. The required courses as well as the related accredited examinations are shown in tables 1 to 4 below.

The following abbreviations are used:

Type of course	Type of exam	Scope of exam
V Lecture	B Bachelor's thesis	SWS Semester hours
P R Project	R Seminar Paper and presentation	ECTS ECTS points in compliance with the European Credit Transfer System
S Seminar	PF Portfolio	E Medium of instruction is English
P Practical, exercises	K(xx) Written examination duration of xx minutes	D Medium of instruction is German
	M Oral examination	
	PA Practical work (lab, term or seminar paper or project work)	
	RPA Practical work documented by a seminar paper and presentation (PF: 50% PA graded and 50% R graded)	

(3) Elective Modules

The elective modules available are announced by display on the notice board at the beginning of each semester.

If students wish to choose elective modules from the offer of other universities, a special permission by the Examination Committee will be required. Tutorials held by the student can be recognized as elective module, whereby the maximum number of ECTS to be earned is five.

(4) Accredited Examinations

The type of accredited examination and course achievements is shown in tables 1 and 2. Every accredited examination must be passed. § 8 of this SPO is still valid. The rating of the examinations is according § 13 of this SPO.

(5) Practical Semester (Compulsory)

The 5th semester is a practical semester. A prerequisite for beginning the practical semester is that, by the end of the 4th semester, the student has passed examinations of the first two semesters amounting to 60 ECTS. In case of the vocational training version of this study program, the practical semester can be done during the practical phases during the lecture free times in the cooperating companies (see section 7).

During their practical semester, the students shall work on an engineering task from the fields of electrical or automotive engineering, thereby becoming acquainted with the professional requirements, industrial work methods and the operational environment with regard to the planning, development and application of electronic networks and systems.

The fields of work can be as follows:

- Planning and implementation of electronic and information technology systems
- Planning, design and development of electronic circuits
- Testing of networks and systems
- Software development
- Use of computers for the design of circuits and systems (CAD)
- Computer simulations
- Planning, design and development of electric drives
- Planning and implementation of mechatronic systems in automotive engineering

Total duration: 22 weeks with at minimum 95 presence days in the company.

(6) **Bachelor's Thesis**

Prior to beginning the **Bachelor's** thesis, all examinations and course achievements of the first four semesters as well as the practical semester must have been completed. The professor assigning the **Bachelor's** Thesis must limit the topic, the task and the extent of the thesis in such way that it can be completed in approx. 360 hours of work corresponding to 12 ECTS. See §12 of the general part of the SPO.

(7) Vocational Training Study Program

The curriculum comprises 9 semesters in case of the Vocational Training Study Program and **leads at first to a „certified occupation requiring formal training“** (e.g. Elektroniker/Elektronikerin für Energie- und Gebäudetechnik, Elektroniker/Elektronikerin für Betriebstechnik, Mechatroniker/Mechatronikerin). The semester of the non vocational training will be integrated into the adapted curriculum Table 5. The curriculum will be completed with training sections from the cooperating companies and the industrial school. For this parts, the companies and the industrial schools will be responsible (the language is German). The compulsory practical semester will be done during the practical phases during the lecture free times in the cooperating companies. **The projects, seminars and the Bachelor's thesis can be done in the cooperating companies**

(8) Validity

This SPO is valid starting from winter semester 2022/23.

Table 1: Bachelor Study Program E-Mobility and Green Energy
Basic: for students of the english study program

Module	Course	Curricular semester assigned				Graded examination
			1	2	3	
		Typ	ECTS/ SWS	ECTS/ SWS	ECTS/ SWS	
Electrical Engineering 1: Basics	Analysis of Electric Networks	V	5/4			K90
Electrical Engineering 2: Electrodynamics	Electrodynamics	V		5/4		K90
Electrical Engineering 3: Time and Frequency Domains	Circuit Analysis in the Time and Frequency Domains	V			5/4	K90
Metrology 1: Basics	Metrology 1	V/2		5/4		K90
	Metrology Practical	P/2				
Mathematics 1: Analysis 1	Analysis 1 with Exercises	V	5/4			K90
Mathematics 2: Linear Algebra	Linear Algebra with Exercises	V	5/4			K90
Mathematics 3: Analysis 2	Analysis 2 with Exercises	V		5/4		K90
Robotics	Robotics	V+P			5/4	PF
Programming	Programming	V+P	5/4			K90
Electrical Engineering Practical ¹	Basic Practical Electrical Engineering 1: Basic Circuits	P/2			5/4	PF
	Basic Practical Course Electrical Engineering 2: Implementation & Verification	P/2				
Digital Technology	Digital Technology	V	5/4			K90
Automotive Engineering	Automotive Engineering	V		5/4		PF
Automotive Engineering: Practical and Computer Aided Design (CAD)	Practical Automotive Engineering	P/2			5/4	PF
	CAD	P/2				
Electronics	Electronics	V			5/4	K90
Materials Science	Materials Science	V		5/4		K90
Machinery Design	Machinery Design	V			5/4	K90 or PF
Computer-Aided Circuit Design 1 ²	Basic Practical Electrical Engineering: Programming of uC	P/2		5/4		PF
	Circuit Design Practical	P/2				
Physics Mechanics	Physics Mechanics	V	5/4			K90
summary ECTS / SWS			30/24	30/24	30/24	

1) Electrical Engineering Practical: only in summer semesters.

2) Computer-Aided Circuit Design 1: only in winter semesters.

Table 2: Bachelor Study Program E-Mobility and Green Energy
Main: for students of the english study program

Module	Course	Curricular semester assigned					Graded examination
			4	5	6	7	
		Typ	ECTS/ SWS	ECTS/ SWS	ECTS/ SWS	ECTS/ SWS	
Digital Signal Processing	Digital Signal Processing	V+P			5/4		PF
Image Processing	Basic of Image Processing	V+P				5/4	PF
Language	German	V+P	5/4				PF
Seminar: Scientific Work	Scientific Work	S+P			5/4		RPA
Green Energies and Energy Storage	Green Energies and Energy Storage	V/4				7/6	K90 + PA
	Practical Environmental and Process Engineering	P/2					
Power Electronics	Power Electronics	V	5/4				K90
Control Engineering	Control Engineering with Exercises	V/4				6/6	K90
	Control Engineering Practical	P/2					
Microcontroller	Microcontroller	V			5/4		RPA
	Microcontroller Practical	P					
Seminar: Main Study	Project-Seminar	PR	5/0				RPA
Introduction to Power Train Engineering	Introduction to Power Train Engineering	V	5/4				K90
Real-Time Programming	Real-Time Programming	V			5/4		K90
	Real-Time Programming Practical	P					
Profile 1	Study Focus 1		5/0				see table 3
Profile 2	Study Focus 2				5/0		see table 3
Profile 3	Study Focus 3				5/0		see table 3
Elective Module	Elective Module		5/0				see electives
Bachelor's thesis	Bachelor's thesis incl. Final Colloquium (15% of grade)					12/0	B + R
summary ECTS / SWS			30/12	30	30/16	30/16	

Table 3: Bachelor Program E-Mobility and Green Energy
Modules: Profiles, Study)

Module	Course	Curricular semester assigned			Graded examination
			SS	WS	
		Typ	ECTS/ SWS	ECTS/ SWS	
Automotive Electronics	Automotive Electronics Controls	V		5/4	K90
Solar Cells, Fuel Cells and Batteries	Photovoltaics	V		5/4	K90
	Batteries and Fuel Cells	V			
Mathematics 4: Statistics and Numeric	Statistics	V+P	5/4	5/4	PF
	Numeric	V+P			
Intelligent Transportation Systems	Intelligent Transportation Systems	V	5/4	5/4	M
High Voltage Vehicles	High Voltage Vehicles	V	5/4	5/4	PF
Electric Power Trains	Hybrids in Cars	V	5/4	5/4	K90
Selected Topics	Special Topics - see announcements		announcement	announcement	announcement

Table 4: Bachelor Program E-Mobility and Green Energy
Curriculum Vocational Training Variant (German only)

Semester	Unternehmen	Hochschule	Abschluss
1	Vertrag/Vorstellung		
2	Ausbildung		
3		1. Theoriesemester	Grundstudium
4		2. Theoriesemester	Grundstudium
5		3. Theoriesemester	Hauptstudium
6		4. Theoriesemester	Hauptstudium
7	Praxis		
8		6. Theoriesemester	Hauptstudium
9	Bachelorarbeit	7. Theoriesemester	B. Eng.