

§ 52 Bachelor's Study Program Mechatronics

(1) Structure of the Study Program

The study program Mechatronics is divided into two study phases. The first study phase (semesters 1 to 2) represents the basic studies and concludes with the intermediate examination according to § 7 Section 2 of the General Part of the Study and Examination Regulations. The second study (semesters 3 to 7) phase is the main study period, which includes compulsory subjects, individual specialization and individual electives as well as the compulsory practical study semester and the Bachelor's examination. The standard period of study is seven semesters. The courses are offered in English. German courses are offered in parallel so that a German B2 language level is reached before the internship semester starts. The successful completion of the program requires 210 ECTS credits. The program is completed with the Bachelor's examination.

(2) Courses and Examinations

The courses of the two study phases as well as the associated examination achievements result from the following tables 1 to 3. German native students have to choose English in the language module. The following abbreviations are used:

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

(3) Profile Specialization

The study course Mechatronics offers individual profile specializations that reflect modern job profiles (see following tables). The students have to choose one with the re-matriculation for the 4th semester. The number of offered specializations can depend on the number on enrolled students and availability of resources. The currently offered specializations will be decided in the faculty council and will be announced in due time.

Each profile specialization offers one diversification module. This allows students to choose one module from the list of the other profile specializations to gain knowledge and skills in areas beyond their specialization choice.

(4) Elective Modules

Two additional elective modules are available to students for their individual profile formation. Available elective modules are announced by display on the notice board at the beginning of each semester. Only modules which are not identical in content to compulsory subjects or have only a slight overlap in content can be selected as electives. In addition, the examination board of the study program can recognize achievements made elsewhere (e.g. tutoring, voluntary work, etc.) upon application by the student in individual cases.

(5) Scientific Project

Each scientific project work is completed with a presentation. The execution of the project work is accompanied by a seminar.

(6) Practical Study Semester

The sixth semester is a practical study semester. It can only be taken up if the intermediate examination according to § 7 Section 2 of the General Part of the Study and Examination Regulations has been passed. The practical study semester comprises a practical activity in a company, the contents of which must be designed in accordance with the job profiles of a Mechatronics graduate. The competencies acquired during the study course are to be applied and deepened by working on suitable projects in the company. The students should get to know the technical requirements, the working methods and the operational environment in practice and work on applied projects as independently as possible as well as jointly responsible, considering the operational conditions. During the Practical Study Semester, students are supervised by the Internship Office. Various requirements must be fulfilled for the recognition of the Practical Study semester. The Internship Office defines these requirements, such as the preparation of an interim and a final report, and specifies the date of submission and the format of these reports. Students are informed through the intranet and an information session.

At the end of the Practical Study Semester, Internship Days are organized to review the semester, during which a final presentation is to be given. Attendance at the Internship Days is mandatory. In exceptional cases, with special approval from the head of the Internship Office, a recorded final presentation may be created instead of attending the Internship Days, and it should be presented during these days. The student is responsible for obtaining approval for the final presentation from the company.

(7) Bachelor's Thesis

Prior to beginning the thesis, all examinations and course achievements of the first four semesters as well as the practical semester must have been completed. The supervising professor assigning the 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. The bachelor seminar serves to reflect on the contents of the bachelor thesis in connection with the course contents of the degree program and is conducted by the supervisor of the thesis

(8) Validity

This SPO is valid starting from summer semester 2025.

**Table 1: Bachelor's Study Program Mechatronics
Basic Study Phase**

No.	Module	Course	Curricular semester assigned				Exam
				1	2	3	
			Type	ECTS/ SWS	ECTS/ SWS	ECTS/ SWS	
1	Mechatronics 1: Basics	Mechatronic Basics	VP	5/4			PF
2	Electronics 1: Basics	Linear Network Analysis	VP	5/4			PF
		Lab BET1	P				
3	Computer Science 1: Basics and Programming	Computer Science Basics	VP	5/4			K60 or PF
		Programming 1: Basics	P				
4	Mechanics 1: CAD and Technical Drawing	Technical Drawing	VP	3/2			PF
		CAD	VP	2/2			
5	Maths 1: Analysis 1	Analysis 1	VP	5/4			K90
6	Maths 2: Linear Algebra	Linear Algebra	VP	5/4			K90
7	Mechatronics 2: Metrology	Metrology 1	VP		5/4		K90
		Metrology Practical					PA
8	Electronics 2: Analog Circuits	Analog Circuits	VP		5/4		PF
		Lab BET2	P				
9	Computer Science 2: Object Oriented Programming	Object Oriented Programming	VP		5/4		PA
10	Mechanics 2: Statics and Mechanics of Materials	Statics and Mechanics of Materials	VP		5/4		PF
11	Maths 3: Analysis 2	Analysis 2	VP		5/4		K90
12	Sciences 1: Fundamentals of Physics	Fundamental of Physics	VP		5/4		K90
13	Mechatronics 3: Sensors and Control	Sensors and Control	VP			5/4	PF
14	Electronics 3: Digital Circuits	Digital Circuits	VP			5/4	PF
		Lab BET3	P				
15	Computer Science 3: Application Programming	Application Programming	VP			5/4	PA
16	Mechanics 3: Kinetics and Engineering Design	Kinetics and Engineering Design	VP			5/4	K60 or PF
17	Maths 4: Numerical Analysis	Numerical Analysis	VP			5/4	K90
18	Sciences 2: Electrodynamics	Electrodynamics	VP			5/4	K60
Summary ECTS / SWS				30/24	30/24	30/24	

**Table 2: Bachelor's Study Program Mechatronics
Main Study Phase**

No.	Module	Course	Curricular semester assigned					Exam
			Typ	4	5	6	7	
				ECTS/ SWS	ECTS/ SWS	ECTS/ SWS	ECTS/ SWS	
19	Mechatronics 4: Electric Drives	Electric Drives	VP	5/4				K90
20	Mechatronics 5: Modeling and Simulation	Modeling and Simulation	VP	5/4				K90
21	Sustainability 1: Energy	Integrated Sustainable Energy System	VP	5/4				K90
22	Specialization Module 1	see table 3		5/4				
23	Specialization Module 2	see table 3		5/4				
24	Sciences 3: Materials	Materials	VP	5/4				K60
25	Mechatronics 6: Microcontroller	Advanced Microcontroller Programming	VP		5/4	-	-	PA
26	Mechatronics 7: Scientific Project	Scientific Project	PR		5/4			PA
27	Mechatronics 8: Robotics	Robotics	VP		5/4			K60
		Robotics Labs						
28	German / Language Equivalent	German B2 Level / Language equivalent	SP		5/4			PF
29	Specialization Module 3	see table 3			5/4			
30	Specialization Module 4	see table 3			5/4			
31	Practical Semester	Practical semester seminar				30/1		RPA ungraded
32	Elective 1	Elective subject 1					5 *)	
33	Elective 2	Elective subject 2					5 *)	*)
34	Sustainability 2	Sustainability and Ethics in Mechatronics	S				5/2	R
35	Bachelor's Thesis and Bachelor's Seminar	Bachelor's Seminar	S				3/2	Thesis
		Bachelor's Thesis					12	
Summary ECTS / SWS				30/24	30/24	30/1	30/4	

*) SWS and type of exam of elective modules depend on the individual choices made by students.

**Table 3: Bachelor's Study Program Mechatronics
Specializations**

No.	Specialization 1	Production Mechatronics				
	Module	Course	Curricular semester assigned			Graded exam.
				4	5	
			Typ	ECTS/ SWS	ECTS/SWS	
36	Production Mechatronics 1: Digital Production and Industry 4.0	Digital Production and Industry 4.0	VP	5/4		PA
37	Production Mechatronics 2: Introduction Production Technologies	Introduction Production Technologies	VP		5/4	K60
38	Production Mechatronics 3: Advanced Production Technologies	Advanced Production Technologies	VP		5/4	K60
39	Production Mechatronics 4: Diversification Module	individual choice: any module of other profile specialization		5/4		see selected module

No.	Specialization 2	Automation				
	Module	Course	Curricular semester assigned			Exam
				4	5	
			Typ	ECTS/ SWS	ECTS/SWS	
40	Automation 1: Digital Production and Industry 4.0	Digital Production and Industry 4.0	VP	5/4		PA
41	Automation 2: Control Systems	Control Systems	VP	5/4		K90
42	Automation 3: Human-Machine-Interface Design	Human-Machine-Interface Design	VP		5/4	RPA graded
43	Automation 4: Diversification Module	individual choice: any module of other profile specialization			5/4	see selected module

B. Special Part: Bachelor's Study Program Mechatronics
valid from SoSe2025 (technical version P01)

No.	Specialization 3	Smart Sensors				
	Module	Course	Curricular semester assigned			Graded exam.
				4	5	
			Typ	ECTS/ SWS	ECTS/SWS	
44	Smart Sensors 1: Sensors	Sensors Overview	VP	5/4		K90
45	Smart Sensors 2: Data Analytics	Data Analytics & Statistics	VP	5/4		K90
46	Smart Sensors 3: Digital Twins	Digital Twins	VP		5/4	K90
47	Smart Sensors 4: Diversification Module	individual choice: any module of other profile specialization			5/4	see selected module

No.	Specialization 4	Mobility				
	Module	Course	Curricular semester assigned			Graded exam.
				4	5	
			Typ	ECTS/ SWS	ECTS/SWS	
48	Mobility 1: Automotive Engineering	Automotive Engineering	VP	5/4		PF
49	Mobility 2: Mobility Lab	Mobility Lab	P		5/4	PF
50	Mobility 3: High Voltage Vehicles	High Voltage Vehicles	VP		5/4	PF
51	Mobility 4: Diversification Module	individual choice: any module of other profile specialization		5/4		see selected module

No.	Specialization 5	Renewable Energy Mechatronics				
		Course	Curricular semester assigned			Graded exam
				4	5	
			Typ	ECTS/ SWS	ECTS/ SWS	
52	Energy Mechatronics 1: Energy and Process Technology	Energy and Process Technology	VP	5/4		K90
53	Energy Mechatronics 2: Energy technology lab course	Energy technology lab course	P	5/4 *)		PA
54	Energy Mechatronics 3: Renewable Energy Systems and Energy Storage	Renewable Energy Systems and Energy Storage	VP		5/4	K90
55	Energy Mechatronics 4: Diversification Module	individual choice: any module of other profile specialization		5/4		see selected module

*) The energy technology lab spans over 2 semesters due to the nature of the lab experiments.

No.	Specialization 6	Photonics				
		Course	Curricular semester assigned			Graded exam
				4	5	
			Typ	ECTS/ SWS	ECTS/ SWS	
56	Photonics 1: Engineering Optics	Engineering Optics	VP	5/4		M or K90
57	Photonics 2: Machine Vision	Machine Vision	VP		5/4	PF
58	Photonics 3: Optoelectronics	Optoelectronics	VP		5/4	K90
59	Photonics 4: Diversification Module	individual choice: any module of other profile specialization		5/4		see selected module