HOCHSCHULE HEILBRONN

Bachelor's degree programme: Mechatronics and Robotics (MR-B)

The following study and examination regulations (in German “SPO”) were verified and approved by the Senate at its 454th meeting on 30 April 2025.

Only the German version of this document is legally binding!

Prof. Dr. Ulrich Brecht
Prorector for Learning and Teaching

§ 49

Bachelor's degree programme
Mechatronics and Robotics (MR-B)

1 Basics of the programme structure

1.1 Total scope

The total scope of the compulsory and compulsory elective courses required for successful completion of the programme is **128** semester hours per week and leads to the acquisition of **210** ECTS credits.

1.2 Structure of the programme

The compulsory courses required for successful completion of the programme and the associated examinations and preliminary examination requirements are listed in Tables 2.1 and 2.3 and Table 3. The courses are assigned to individual modules, which are awarded with ECTS credits.

1.3 Language

All courses are held in either German or English (§3 (5), SPO AT Bachelor 7sem).

1.4 Basic studies in German or English

Depending on admission, the basic studies must be completed in either German or English.

2 Basic studies

2.1 Basic studies in German

2.1.1 Subjects taught in German

The courses offered in the basic study programme are listed in Table **2.1.**

Table 2.1: Basic studies in German[1]

Semester	Course					Examination		Prerequisite		ECTS
	Module	No	Course title	Type	SWS	Type	Duration	Type	Duration	
1	G1	**607010**	**Mathematics 1**			LK	90			
		607011	Mathematics 1	V/Ü	6	Module exam				5
	G3	**607030**	**Physics**			LK	90			
		607031	Physics	V/Ü	4	Module exam				5
	G4	**607040**	**Computer Science 1**			LK	90			
		607041	Computer Science 1	V/Ü	4	Module exam				5
	G6	**607060**	**Electrical Engineering and Electronics 1**			LK	90			
		607061	Electrical Engineering and Electronics 1	V/Ü	4	Module exam				5
	G8	**607080**	**Technical Mechanics 1**			LK	60			
		607081	Technical Mechanics 1	V/Ü	4	Module exam				5
	G11	**607110**	**Fundamentals of Mechatronics and Robotics**			LP				
		607111	Scientific work	V/Ü	2	Module exam				2
		607112	Introduction to Mechatronics and Robotics	V/Ü	2	Module exam				2
Total 1st semester					**26**	**6**		**0**		**30**
2	G2	**607020**	**Mathematics 2**			LK	120			
		607021	Mathematics 2	V/Ü	4	Module exam				5
	G5	**607050**	**Computer Science 2**			LK	120			
		607051	Computer Science 2	V/Ü	4	Module exam				5
	G7	**607070**	**Electrical Engineering and Electronics 2**							
		607071	Electrical Engineering and Electronics 2	V/Ü		LK	90			2
		607072	Electrical Engineering Laboratory	L/S	2			SL		2
	G9	**607090**	**Technical Mechanics 2+ 3**			PK	120			
		607091	Technical Mechanics 2	V/Ü	2	Module exam				2
		607092	Technical mechanics 3	V/Ü	2	Module exam				2
	G10	**607100**	**Materials**			PK	90			
		607101	Materials: Metals	V/Ü	2	Module exam				2
		607102	Materials: Plastics	V/Ü	2	Module exam				2
	G12	**607120**	**Fundamentals of design and manufacturing**			LK	12			
		607121	Fundamentals of Design and Manufacturing	V/Ü	4	Module exam				5
Total 2nd semester					**24**	**6**		**1**		**30**

[1] See https://cdn.hs-heilbronn.de/ff7396326d75e064/21b0725bd705/2014-05-04-SPO-AT-Bachelor_ENGLISCH.pdf page 26 for abbreviations

2.1.2 Module exams of the German basic studies

The Module exams of the basic studies are listed in Table 2.2:

Table 2.2: Module exams of the Bachelor's preliminary examination, Weighting of individual examination results and module grades

Module grades for the basic studies: Mechatronics and Robotics (MR)					
Module	No	Module designation			Weighting of the module grade for the grade in accordance with § 22
		Examination	No	Prerequisite	
Mathematics and physics					
G1	**60701**	**Mathematics 1**			5
	607011	Mathematics 1			
G2	**607020**	**Mathematics 2**			5
	607021	Mathematics 2			
G3	**607030**	**Physics**			5
	607031	Physics			
Computer science					
G4	**607040**	**Computer Science 1**			5
	607041	Computer Science 1			
G5	**607050**	**Computer Science 2**			5
	607051	Computer Science 2			
Electrical Engineering					
G6	**607060**	**Electrical Engineering and Electronics 1**			5
	607061	Electrical Engineering and Electronics 1			
G7	**607070**	**Electrical Engineering and Electronics 2**			5
	607071	Electrical Engineering and Electronics 2			
			607072	Electrical Engineering Laboratory	
Technical Mechanics and Materials					
G8	**607080**	**Technical Mechanics 1**			5
	607081	Technical Mechanics 1			
G9	**607090**	**Technical Mechanics 2+3**			5
	607091	Technical Mechanics 2			
	607092	Technical Mechanics 3			
G10	**607100**	**Materials**			5
	607101	Materials: Metals			
	607102	Materials: Plastics			
Design, manufacturing, mechatronics and robotics					
G11	**607110**	**Fundamentals of mechatronics and robotics**			5
	607111	Scientific work			
	607112	Introduction to Mechatronics and Robotics			
G12	**607120**	**Fundamentals of Design and Manufacturing**			5
	607121	Fundamentals of Design and Manufacturing			
Total					**60**

2.1.3 Admission requirements

To participate in 607072 Electrical Engineering Laboratory, 607061 Electrical Engineering and Electronics 1 must have been passed.

2.2 Basic studies in English

2.2.1 Subjects in English

The courses in the basic studies in English are listed in Table 2.3.

Table 2.3: Basic studies in English

Semester	Course					Examination		Prerequisite		ECTS
	Module	No	Course title	Type	SWS	Type	Duration	Type	Duration	
1	G1	**607510**	**Mathematics 1**			LK	90			
		607511	Mathematics 1	V/Ü	6	Module exam				5
	G3	**607530**	**Physics**			LKBK	90			
		607531	Physics	V/Ü	4	Module exam				5
	G4	**607540**	**Electrical Engineering and Electronics 1**			LK	90			
		607541	Electrical Engineering and Electronics 1	V/Ü	4	Module exam				5
	G6	**607560**	**Programming 1**			LK	90			
		607561	Programming 1	V/L	4	Module exam				5
	G8	**607580**	**Engineering Mechanics 1**			LK	60			
		607581	Engineering Mechanics 1	V/Ü	4	Module exam				5
	G11	**607610**	**German Language and Academic Skills 1** [1)]			LP				
		607611	German Language and Academic Skills 1	V/S	4	Module exam				5
Total 1st semester					**26**	**6**		**0**		**30**

2	G2	**607520**	**Mathematics 2**			LK	120			
		607521	Mathematics 2	V/Ü	4	Module exam				5
	G5	**607550**	**Electrical Engineering and Electronics 2**							
		607551	Electrical Engineering and Electronics 2	V/Ü	2	LK	90			2.5
		607552	Electrical Engineering Laboratory	L/S	2			SL		2.5
	G7	**607570**	**Programming 2**			LK	120			
		607571	Programming 2	V/L	4	Module exam				5
	G9	**607590**	**Engineering Mechanics 2 and 3**			PK	120			
		607591	Engineering Mechanics 2	V/Ü	2	Module exam				2..5
		607592	Engineering Mechanics 3	V/Ü	2	Module exam				2.5
	G10	**607600**	**Materials**			PK	90			
		607601	Materials: Plastics	V/Ü	2	Module exam				2.5
		607602	Materials: Metals	V/Ü	2	Module exam				2.5
	G12	**607620**	**German Language and Academic Skills 2** [2)]			LP				
		607621	German Language and Academic Skills 2	V/S	4	Module exam				5
Total 2nd semester					**24**	**6**		**1**		**30**

[1] *607610 German Language and Academic Skills 1*: Written and oral knowledge of German at level B1, proven by a written examination (with an oral component if applicable), e.g. telc B1, Goethe Zertifikat B1, DSD I or equivalent

[2] *607620 German Language and Academic Skills 2*: Written and oral knowledge of German at level B2, proven by a written examination (with an oral component if applicable), e.g. telc B2, Goethe Zertifikat B2, DSD II, TestDaF 3, DSH 1 or equivalent; see also point 3.5

2.2.2 Module exams of the basic English course

The Module exams of the basic studies are listed in Table 2.4:

Table 2.4: Module exams of the preliminary Bachelor's examination

Module grades for the basic course in English: Mechatronics and Robotics (MR)					
Module	**No**	**Module name**			**Weighting of the module grade for the grade according to § 22**
		Examination	**No**	**Prerequisite**	
Mathematics and Physics					
G1	**607510**	**Mathematics 1**			**5**
	607511	Mathematics 1			
G2	**607520**	**Mathematics 2**			**5**
	607521	Mathematics 2			
G3	**607530**	**Physics**			**5**
	607531	Physics			
Electrical Engineering					
G4	**607540**	**Electrical Engineering and Electronics 1**			**5**
	607541	Electrical Engineering and Electronics 1			
G5	**607550**	**Electrical Engineering and Electronics 2**			**5**
	607551	Electrical Engineering and Electronics 2			
			607552	Electrical Engineering Laboratory	
Programming					
G6	**607560**	**Programming 1**			**5**
	607561	Programming 1			
G7	**607570**	**Programming 2**			**5**
	607571	Programming 2			
Engineering Mechanics					
G8	**607580**	**Engineering Mechanics 1**			**5**
	607581	Engineering Mechanics 1			
G9	**607590**	**Engineering Mechanics 2 and 3**			**5**
	607591	Engineering Mechanics 2			
	607592	Engineering Mechanics 3			
G10	**607600**	**Materials**			**5**
	607601	Materials: Plastics			
	607602	Materials: Metals			
German and Academic Skills					
G11	**607610**	**German Language and Academic Skills 1**			**5**
	607611	German Language and Academic Skills 1			
G12	**607620**	**German Language and Academic Skills 2**			**5**
	607621	German Language and Academic Skills 2			
Total					**60**

2.2.3 Admission requirements

To participate in 607552 *Lab Electrical Engineering,* 607541 *Electrical Engineering and Electronics 1* must have been passed.

2.3 Bachelor's preliminary examination

The preliminary bachelor's examination for the German and English basic studies includes the module grades for all modules listed in Table 2.2 (German) or Table 2.4 (English). If several performance assessments take place at the course level within a module, the module grade is determined according to a weighted arithmetic mean of the individual performances contained in the module in accordance with the ECTS. The overall grade for the preliminary Bachelor's examination is calculated as the weighted arithmetic mean of the module grades, with the weights for the individual grades being determined on the basis of the ECTS credits listed in Table 2.2 (German) or Table 2.4 (English).

3 Main studies

3.1 Subjects

The courses in the main study programme are listed in Table 3.

Table 3: Subjects in the main study period

Semester	Course					Examination		Prerequisite		ECTS
	Module	No	Course title	Type	SWS	Type	Duration	Type	Duration	
3	H1	**607210**	**Measurement technology and sensor technology**			LP				
		607211	Measurement Technology	V/Ü	2	Module exam				2.5
		607212	Sensors	V/Ü	2	Module exam				2.5
	H	**607220**	**Signals and systems**			LK	120			
		607221	Signals and Systems	V/Ü	4	Module exam				5
	H5	**607250**	**Maths 3+ Physics laboratory**							
		607251	Mathematics 3	V/Ü		LK	60			2.5
		607252	Physics laboratory	L/S	2			SL		2.5
	H9	**607290**	**Microcontroller + Software engineering**			LP				
		607291	Microcontrollers	V/Ü	2	Module exam				2.5
		607292	Software engineering	V/Ü	2	Module exam				2.5
	H1	**607320**	**Electronic Circuit Technology with Laboratory**							
		607321	Electronic Circuit Technology	V/Ü	2	LK	6			2.5
		607322	Laboratory for Electronic Circuit Technology	L/S	2			SL		2.5
	H1	**607340**	**Design of mechatronic systems**			LE				
		607341	Design of mechatronic systems	V/Ü	4	Module exam				5
Total 3rd semester					**24**	**6**		**2**		**30**
4	H3	**607230**	**Control engineering**			LK	120			
		607231	Control engineering	V/Ü	4	Module exam				5
	H4	**607240**	**Laboratory for Measurement and Control Engineering**							
		607241	Laboratory for Measurement Technology	L/S	2			LL		2.5
		607242	Laboratory control engineering	L/S	2			SL		2.5
	H6	**607260**	**Industrial robot**			LP				
		607261	Industrial robot	V/L	4	Module test				5
	H7	**607270**	**Electrical drive systems**			LK	120			
		607271	Electrical drive systems	V/Ü	4	Module exam				5
	H1	**607300**	**Industrial Internet of Things**			PK	90			
		607301	Fundamentals of Network Technology	V/Ü	2	Module exam				2.5
		607302	Networked systems	V/Ü	2	Module exam				2.5
	H1	**607380**	**Specialised consolidation 1**							
			Elective subject(s) in accordance with Section 3.2		4	Lx				5
Total 4th semester					**24**	**5**		**2**		**30**

5	**H13**	**607330**	**Practical study semester**						
		607331	Supervised practical phase		0		SA		26
		607332	Colloquium on the practical study semester	S	0		SR		4
Total 5th semester					**0**	**0**	**2**		**30**

6	**H8**	**607280**	**Automation Technology and Digital Signal Processing**			LP			
		607281	Automation Technology	V/Ü	2	Module exam			2.5
		607282	Digital Signal Processing	V/Ü	2	Module exam			2.5
	H1	**607350**	**Integrated product development with design competition**			LP			
		607351	Integrated Product Development with Design Competition	V/Ü	4	Module exam			5
	H1	**607360**	**Ethics**			LR			
		607361	Ethics	V/Ü	2	Module exam			2.5
	H1	**607370**	**Seminar paper**			LE			
		607371	Seminar paper	L/S	0	Module exam			7.5
	H1	**607390**	**Specialisation 2**						
			Elective subject(s) in accordance with section 3.2		4	Lx			5
	H2	**607400**	**Specialisation 3**						
			Elective subject(s) in accordance with section 3.2		4	Lx			5
Total 6th semester					**18**	**6**		**0**	**30**

7	**H11**	**607310**	**Human-machine systems and technical physics**						
		607311	Human-Machine Systems		2	LA			2.5
		607312	Fields and waves	V/Ü	2	LKBK	6		2.5
	H21	**607410**	**Specialisation 4**						
			Elective subject(s) in accordance with section 3.2		4	L			5
	H2	**607420**	**Specialisation 5**						
			Elective subject(s) in accordance with section 3.2		4	L			5
	H23	**607430**	**Bachelor thesis / project**						
		607431	Project planning and colloquium	S	0	PA			3
		607432	Bachelor thesis / project		0	PB			12
Total 7th semester					**12**	**6**		**0**	**30**

3.2 Electives

To fulfil the **examination requirements for "Specialisation 1-3"**, students select technical electives totalling 15 ECTS from the VF catalogue. To fulfil the **examination requirements for "Specialisation 4-5",** technical electives totalling 10 ECTS are selected from the VF catalogue or the WF catalogue.

Students in the **English basic studies programme** must take the course 607380 *Specialisation 1* the subject 607121 *Fundamentals of Design and Manufacturing* from the VF catalogue.

The courses from the VF and WF catalogues are designed to enable students to deepen their studies. Students can choose specialisations here by successfully completing the elective courses assigned to the respective specialisation. The assignment of each elective course to one or more areas of specialisation is indicated in the VF and WF catalogues and in the module handbook. Selected areas of specialisation can be indicated on the transcript.

The VF and WF catalogues are part of the module handbook and are available on the programme homepage and the official digital learning platform of the university by the end of the previous semester at the latest. Subjects from other programmes outside the Heilbronn University faculty or from other universities may be recognised upon request. Participation in elective courses may be limited due to capacity reasons.

Changes to the VF and WF catalogues are approved by the Examination Board upon request of the lecturer responsible for the course in question, after consultation with the Faculty Council and the Study Commission. The subjects offered must take into account the competence objectives of the degree programme and must correspond to at least level 6 of the German Qualifications Framework. Multiple crediting of subjects is not permitted.

3.3 Module exams in the main study period

The Module exams of the Bachelor's examination, the associated examination requirements and preliminary examination requirements, as well as the weighting of the grades for the individual examination requirements and the module grades and the Bachelor's thesis are shown in Table 4.

Table 4: Module exams for the Bachelor's examination, weighting of the grades for the individual examination performances and module grades

Module grades for the main study programme: Mechatronics and Robotics (MR)					
Module	**No**	**Module name**			**Weighting of the module grade for the grade in accordance with § 29**
		Examination	**No**	**Preliminary examination**	
Measurement and control engineering					
H1	**607210**	**Measurement Technology and Sensor Technology**			**5**
	607211	Measurement technology			
	607212	Sensor technology			
H2	**607220**	**Signals and systems**			**5**
	607221	Signals and Systems			
H3	**607230**	**Control engineering**			**5**
	607231	Control engineering			
H4	**607240**	**Laboratory for Measurement and Control Engineering**			**5**

			607241	Laboratory for Measurement Technology	
			607242	Control Engineering Laboratory	

Mathematics and Physics					
H5	**607250**	**Mathematics 3 + Physics Laboratory**			**5**
	607251	Mathematics 3			
			607252	Physics laboratory	
Robotics and automation technology					
H6	**607260**	**Industrial robots**			**5**
	607261	Industrial robots			
H7	**607270**	**Electrical drive systems**			**5**
	607271	Electrical drive systems			
H8	**607280**	**Automation technology and digital signal processing**			**5**
	607281	Automation technology			
	607282	Digital Signal Processing			
Software and network technology					
H9	**607290**	**Microcontrollers + Software Engineering**			**5**
	607291	Microcontrollers			
	607292	Software Engineering			
H10	**607300**	**Industrial Internet of Things**			**5**
	607301	Fundamentals of Network Technology			
	607302	Networked Systems			
H11	**607310**	**Human-machine systems and technical physics**			**5**
	607311	Human-Machine Systems			
	607312	Fields and waves			
H12	**607320**	**Electronic Circuit Technology with Laboratory**			**5**
	607321	Electronic Circuit Technology			
			607322	Laboratory Electronic Circuit Technology	
Practical study semester					
H1	**607330**	**Practical study semester**			**0**
			607331	Supervised practical phase	
			607332	Colloquium on the practical study semester	
Design and Product Development					
H14	**607**	**Design of mechatronic systems**			**5**
	607341	Design of mechatronic systems			
H15	**607350**	**Integrated Product Development with Design Competition**			**5**
	607351	Integrated Product Development with Design Competition			
General Studies					
H1	**607360**	**Ethics**			**2.5**
			607361	Ethics	
Seminar paper					
H17	**607370**	**Seminar paper**			**7.5**
	607371	Seminar paper			

Specialisation					
H18	**607380**	**Specialisation 1**			**5**
		Elective subject(s) in accordance with section 3.2			
H19	**607390**	**Specialisation 2**			**5**
		Elective subject(s) in accordance with section 3.2			
H20	**607400**	**Specialisation 3**			**5**
		Elective subject(s) in accordance with section 3.2			
H2	**607410**	**Specialisation 4**			**5**
		Elective subject(s) in accordance with section 3.2			
H22	**607420**	**Specialisation 5**			**5**
		Elective subject(s) in accordance with section 3.2			
Bachelor's thesis					
H23	**607430**	**Bachelor thesis / project**			**15**
	607431	Project planning and colloquium			
	607432	Bachelor thesis / project			
Total					**12**

3.4 Bachelor's examination

The Bachelor's certificate contains the module grades for all modules listed in Table 4 and the Bachelor's thesis. If several performance assessments take place at the course level within a module (including elective modules), the module grade is determined according to a weighted arithmetic mean of the individual performances contained in the module in accordance with the ECTS. The overall grade on the Bachelor's certificate is calculated as the weighted arithmetic mean of the module grades and the grade for the Bachelor's thesis, with the weights for the individual grades being determined on the basis of the ECTS credits listed in Table 4.

3.5 Admission

The following admission requirements apply:

The admission requirement for admission to the main study programme with a basic study programme in English is that module 607620 German Language and Academic Skills 2 has been passed at the minimum language level B2 or equivalent. Proof must be provided by submitting one of the following certificates: DSH-1, Goethe B2, telc B2 (or comparable tests in accordance with the framework regulations for German language tests for studying at German universities). Passing the corresponding GER course level of a DaF course at the Centre for Studies and Teaching at Heilbronn University is also accepted as equivalent proof.

To participate in 607242 Laboratory Control Engineering, 607221 Signals and Systems must have been passed.

To participate in 607241 Laboratory Measurement Technology, 607210 Measurement Technology and Sensor Technology must have been passed.

To participate in 607252 Physics Laboratory, 607031 Physik or 607531 Physics must have been passed.

Successful participation in the practical study semester must be proven at the latest when the Bachelor's thesis is assigned.

The modules of the 3rd and 4th semesters must be passed before the Bachelor's thesis is assigned.

3.6 Practical study semester

The requirements for crediting the practical study semester and the office responsible for crediting are regulated in the general section of these study and examination regulations (§§ 4, 7 para. 2).

During the practical study semester, students should apply the knowledge they have acquired so far in a supervised practical phase. In doing so, they should carry out engineering or information technology tasks independently and with shared responsibility.

A practical study semester completed abroad is expressly desired.

3.7 Special regulations for Study-PLUS models during the contract period between the cooperating company and the student

As part of their studies, Study-Plus students are required to complete additional practical work at their cooperation company during lecture-free and exam-free periods that are not used for statutory holiday entitlement. During these periods, the specialist knowledge acquired to date is applied and consolidated in practice, and students gain in-depth knowledge of the working conditions and methods of engineers.

Their engineering-related activities include working as independently and autonomously as possible, as well as working on and solving specific problems in the following areas:

- Development
- Laboratory, testing and test field
- Design and standardisation
- Production planning and control
- Production and assembly
- Quality assurance
- Project planning
- Technical sales
- or other relevant areas.

The focus is based on the company's capabilities and the content of the degree programme.

The level of the activities must be adapted to the individual progress of the course so that the course content can be learned, applied and consolidated through in-depth practical knowledge.

4 Entry into force

These study and examination regulations (SPO 2) shall enter into force on 1 September 2025. Students who have already commenced their studies at the time of entry into force of these study and examination regulations shall complete the remaining examination requirements and preliminary examination requirements in accordance with the previous study and examination regulations (SPO 1).

Heilbronn, 30 April 2025

Signed
Prof. Dr.-Ing. Oliver Lenzen
Rector

Announcement

The examination regulations are hereby publicly announced in accordance with the announcement regulations of Heilbronn University of Applied Sciences dated 28 June 2017.

Heilbronn, 30 April 2025

For the Prorectorate for Learning and Teaching

Signed
Prof. Dr. Ulrich Brecht