

The following Study and Exam Regulations (German: SPO) were verified and approved by the Senate at its 363rd meeting on 18 January 2017.

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§49

Bachelor's degree programme Mechatronik und Robotik / Mechatronics and Robotics

(MR-B)

1 Overview of the course

1.1 Workload

To be eligible for the award of a bachelor's degree, the candidate must have obtained at least **210** ECTS credits and completed courses totalling **146** hours per week.

1.2 Programme outline

All mandatory courses required for the successful completion of the programme and the corresponding prerequisites and types of assessment are shown in tables 1.1, 1.2, 3.1 and 3.2 below. Courses are grouped into single modules. For each module, the corresponding ECTS credits are listed.

1.3 Language

All courses will be taught in either German or English (§3 (5)).

1.4 Basic Study Period (“Grundstudium” - Semester 1 and 2) in German or English

Depending on the type of admission, English or German will be the primary language of instruction in semester 1 and 2 (“Basic Study Period”).

2 Basic Study Period

2.1 Basic Study Period in German

2.1.1 Courses

Table 1.1 below shows the courses of the “Grundstudium” (Basic Study Period) in German.

Table 1.1: Basic Study Period in German

Semester	Lehrveranstaltung					Prüfungsleistung		Prüfungsvorleistung		ECTS-Punkte
	Nr.	Modul	Bezeichnung	Art	Umfang SWS	Art	Dauer in Min.	Art	Dauer in Min.	
1	134010	G1	Mathematik							
	134011	G1.1	Mathematik 1	V/Ü	6	LK	90			6
	134020	G2	Physik							
	134021	G2.1	Physik	V/Ü	4	LK	90			4
	134030	G3	Informatik							
	134031	G3.1	Informatik 1 - Grundlagen der Programmierung	V/L	4	LK	90			4
	134033	G3.3	Grundlagen der Digitaltechnik	V/Ü	2			SK	60	2
	134040	G4	Elektrotechnik							
	134041	G4.1	Elektrotechnik 1	V/Ü	4	LK	60			4
	134050	G5	Technische Mechanik							
	134051	G5.1	Technische Mechanik 1	V/Ü	4	LK	60			4
	134060	G6	Konstruktion							
	134061	G6.1	Grundlagen des Entwickelns	V/P	2					2
	134062	G6.2	Arbeitstechnik	V/Ü	1	PA				1
	134063	G6.3	Technisches Zeichnen	V/Ü	1					1
134064	G6.4	Robotertechnik	V/Ü	2	LK	60			2	
Summen 1. Semester					30	7		1		30
2	134010	G1	Mathematik							
	134012	G1.2	Mathematik 2	V/Ü	4	LK	120			4
	134020	G2	Physik							
	134022	G2.2	Physik Labor	L	2			SKBK	60	2
	134030	G3	Informatik							
	134032	G3.2	Informatik 2 - Algorithmen und Datenstrukturen	V/L	4	LK	120			4
	134040	G4	Elektrotechnik							
	134042	G4.2	Elektrotechnik 2	V/Ü	4	LK	120			4
	134043	G4.3	Elektronische Schaltungstechnik 1	V/Ü	2			SK	90	2
	134044	G4.4	Labor Elektrotechnik	L	2			SL		2
	134050	G5	Technische Mechanik							
	134052	G5.2	Technische Mechanik 2	V/Ü	4	LK	120			4
	134060	G6	Konstruktion							
	134065	G6.5	Maschinenelemente 1	V/Ü	2	LK	60			2
	134070	G7	Werkstoffe und Fertigungsverfahren							
134071	G7.1	Werkstoffe: Metalle	V/Ü	2	PK	90			2	
134072	G7.2	Werkstoffe: Kunststoffe	V/Ü	2					2	
134073	G7.3	Spanende und Abtragende Fertigungsverfahren	V/Ü	2	LK	60			2	
Summen 2. Semester					30	7		3		30
Summen Grundstudium					60	14		4		60

2.1.2 Module examinations - Basic Study Period in German

Table 1.2 below shows the modules of the Basic Study Period in German:

Table 1.2: Module examinations of the "Bachelorvorprüfung" (Bachelor's Intermediate Examination) in German and weighting of the individual subject and module grades

Modulnote Nr.	Bezeichnung der Modulnote						Gewicht der Modulnote für die Note nach § 22	
	Prüfungsleistung			Prüfungsvorleistung				
	Nr.	Modul	Bezeichnung	Nr.	Modul	Bezeichnung		
134010	Mathematik (Modul G1)						5	
	134011	G1.1	Mathematik 1					1
	134012	G1.2	Mathematik 2					2
134020	Physik (Modul G2)						2	
	134021	G2.1	Physik					1
				134022	G2.2	Physik Labor		
134030	Informatik (Modul G3)						4	
	134031	G3.1	Informatik 1 - Grundlagen der Programmierung					1
	134032	G3.2	Informatik 2 - Algorithmen und Datenstrukturen					2
				134033	G3.3	Grundlagen der Digitaltechnik		
134040	Elektrotechnik (Modul G4)						4	
	134041	G4.1	Elektrotechnik 1					1
	134042	G4.2	Elektrotechnik 2					2
				134043	G4.3	Elektronische Schaltungstechnik 1		
				134044	G4.4	Labor Elektrotechnik		
134050	Technische Mechanik (Modul G5)						4	
	134051	G5.1	Technische Mechanik 1					1
	134052	G5.2	Technische Mechanik 2					2
134060	Konstruktion (Modul G6)						3	
	134066	G6.1	Grundlagen des Entwickelns					1
		G6.2	Arbeitstechnik					
		G6.3	Technisches Zeichnen					
	134064	G6.4	Robotertechnik					1
	134065	G6.5	Maschinenelemente 1					1
134070	Werkstoffe und Fertigungsverfahren (Modul G7)						3	
	134079	G7.1	Werkstoffe: Metalle					2
		G7.2	Werkstoffe: Kunststoffe					
	134073	G7.3	Spanende und Abtragende Fertigungsverfahren					1
Summe						25		

2.1.3 Bachelorvorprüfung (Bachelor's Intermediate Examination)

In order for a "Zeugnis über die Bachelorvorprüfung" (Bachelor's Intermediate Examination certificate) to be issued, all module examinations of the Basic Study Period must be successfully completed in accordance with § 22.

The certificate includes the grades of all module examinations listed in Table 1.2. The grade of each module is calculated based on the weighted average grades of the credit value of each individual examination/assessment, The overall grade of the "Bachelorvorprüfung" (Bachelor's Intermediate Examination) is calculated based on the weighted average grade in the individual modules. The weightings of the individual grades are set out in Table 1.2.

2.1.4 Examinations that cannot be compensated

Students can only pass module 134010 *Mathematik* (Mathematics) if they achieve a grade of "ausreichend" (4.0) or better in both 134011 *Mathematik 1* (Mathematics 1) and 134012 *Mathematik 2* (Mathematics 2).

2.1.5 Preconditions

To participate in *134043 Labor Elektrotechnik* (Electrical Engineering Lab), students must have achieved at least a grade of "ausreichend" (4.0) in *134041 Elektrotechnik 1* (Electrical Engineering).

To participate in *134022 Physik Labor (Physics Lab)*, students must have achieved at least a grade of "ausreichend" (4.0) in *134021 Physik (Physics)*.

2.2 Basic Study Period in English

2.2.1 Courses

Table 2.1 below shows the courses of the Basic Study Period ("Grundstudium") in English.

Table 2.1: Basic Study Period in English

Sem.	Course					Examination/assessment		Preliminary examination		ECTS credits
	No.	Module	Title	Type	No. of hrs. p. week (SWS)	Type	Duration (min)	Type	Duration (min)	
1	134510	G1	Mathematics							
	134511	G1.1	Mathematics 1	V/Ü	6	LK	90			6
	134520	G2	Physics							
	134521	G2.1	Physics 1	V/Ü	4	LK	90			4
	134530	G3	Computer Engineering							
	134531	G3.1	Programming 1	V/L	4	LK	90			4
	134533	G3.3	Introduction to Digital Systems	V/Ü	2			SK	60	2
	134540	G4	Electrical Engineering							
	134541	G4.1	Electrical Engineering 1	V/Ü	4	LK	60			4
	134543	G4.3	Circuit Design	V/Ü	2			SK	60	2
	134560	G6	Engineering Design							
	134562	G6.2	Self-Organisation	V/Ü	1			SP		1
	134563	G6.3	Robotics	V/Ü	2	LK	60			2
	134580	G8	Languages				10)			
134581	G8.1	German/English 1	S	4			SKBK	180	5	
Total Semester 1					29	6		4		30
2	134510	G1	Mathematics							
	134512	G1.2	Mathematics 2	V/Ü	4	LK	120			4
	134520	G2	Physics							
	134522	G2.2	Physics Lab	V/Ü	2			SKBK	60	2
	134530	G3	Computer Engineering							
	134532	G3.2	Programming 2	V/L	4	LK	120			4
	134540	G4	Electrical Engineering							
	134542	G4.2	Electrical Engineering 2	V/Ü	4	LK	120			4
	134550	G5	Mechanical Engineering							
	134551	G5.1	Mechanical Engineering 1	V/Ü	4	LK	60			4
	134560	G6	Engineering Design							
	134561	G6.1	Engineering Design 1	V/P	2	LA				2
	134564	G6.4	Technical Drawing	V/Ü	1					1
	134570	G7	Materials							
	134571	G7.1	Materials: Metals	V/Ü	2	PK	90			2
	134572	G7.2	Materials: Plastics	V/Ü	2					2
134580	G8	Languages				10)				
134582	G8.2	German/English 2	S	4			SKBK	180	5	
Total Semester 2					29	7		2		30
Total Basic Study Period (English)					58	13		6		60

10) International students that have not submitted proof, at the time of enrolment, that they have taken a DSH language test, are required to take the German language course. Students who are German native speakers are required to take the English language course.

2.2.2 Module examinations - Basic Study Period in English

Table 2.2 below shows the modules of the Basic Study Period ("Grundstudium") in English.

Table 2.2: Modules of the "Bachelorvorprüfung" (Bachelor's Intermediate Examination) in English, weighting of the individual subject and module grades

Module grade no.	Module grade						Weighting of the module grade in accordance with § 22	
	Examination/assessment			Preliminary examination				Weighting of the examination grade
	No.	Module	Title	No.	Module	Title		
134510	Mathematics (Modul G1)						5	
	134511	G1.1	Mathematics 1					1
	134512	G1.2	Mathematics 2					2
134520	Physics (Modul G2)						2	
	134521	G2.1	Physics 1					1
				134522	G2.2	Physics Lab		
134530	Computer Engineering (Modul G3)						4	
	134531	G3.1	Programming 1					1
	134532	G3.2	Programming 2					2
				134533	G3.3	Introduction to Digital Systems		
134540	Electrical Engineering (Modul G4)						4	
	134541	G4.1	Electrical Engineering 1					1
	134542	G4.2	Electrical Engineering 2					2
				134543	G4.3	Circuit Design		
134550	Mechanical Engineering (Modul G5)						2	
	134551	G5.1	Mechanical Engineering 1					1
134560	Engineering Design (Modul G6)						2	
				134562	G6.2	Self Organisation		
	134563	G6.3	Robotics					1
	134567	G6.1	Engineering Design 1					1
		G6.4	Technical Drawing					
134570	Materials (Modul G7)						2	
	134579	G7.1	Materials: Metals					1
		G7.2	Materials: Plastics					
134580	Languages (Modul G8)						0	
				134581	G8.1	German/English 1		
				134582	G8.2	German/English 2		
Total							21	

2.2.3 Bachelorvorprüfung (Bachelor's Intermediate Examination)

In order for a "Zeugnis über die Bachelorvorprüfung" (Bachelor's Intermediate Examination certificate) to be issued, all module examinations of the Basic Study Period must be successfully completed in accordance with § 22.

The certificate comprises the grades of all module examinations listed in table 2.2. The grade of each module is calculated based on the weighted average grades of the credit value of each individual examination/assessment. The overall grade of the "Bachelorvorprüfung" (Bachelor's Intermediate Examination) is calculated based on the weighted average grade in the individual modules. The weightings of the individual grades are set out in Table 2.2.

2.2.4 Examinations that cannot be compensated

Students can only pass module 134510 *Mathematics* if they achieve a grade of "ausreichend" (4.0) or better in both 134511 *Mathematics 1* and 134512 *Mathematics 2*.

2.2.5 Prerequisites

To participate in 134522 *Physics Lab*, students must have achieved at least a grade of "ausreichend" (4.0) in 134521 *Physics 1*.

2.3 Pre-university work placement

Students are required to provide proof, at the time of enrolment, of having completed a pre-university work placement.

The requirements for the accreditation of pre-university work placements and the office in charge of accreditation are specified in the general section of these Study and Examination Regulations (§2) and in the "Satzung für das Auswahlverfahren" (Student Selection and Admission Policy) for this degree programme (in particular §2).

The aim of the pre-university work placement is to acquire and foster technical and manual skills. The pre-study internship aims to provide students with a good working knowledge of the production of mechatronic assemblies: These include primary forming, machining, deforming, joining, separating and coating manufacturing processes as well as measuring and testing. They should also be able to gain insight into fundamental design principles and materials.

3 Main study period

3.1 Courses

3.1.1 Courses following the Basic Study Period in German

Table 3.1 below shows the courses of the Hauptstudium (Main Study Period) following the Basic Study Period in German.

Table 3.1: Main Study Period following the Basic Study Period in German

Semester	Lehrveranstaltung					Prüfungsleistung		Prüfungsvorleistung		ECTS-Punkte
	Nr.	Modul	Bezeichnung	Art	Umfang SWS	Art	Dauer in Min.	Art	Dauer in Min.	
3	134110	H1	Regelungstechnik und mathematische Methoden							
	134111	H1.1	Mathematik 3	V/Ü	4	LK	120			4
	134112	H1.2	Signale und Systeme	V/Ü	4	LK	120			4
	134120	H2	Robotik, Sensorik und Aktorik							
	134121	H2.1	Messtechnik und Sensorik	V/Ü	4	LK	120			4
	134130	H3	Konstruktion							
	134131	H3.1	Konstruieren mit CAD	V/L	4	LE				4
	134140	H4	Informationstechnik							
	134141	H4.1	Mikrocontroller	V/L	2	LKBK	90			3
	134142	H4.2	Labor Elektronik	L	2			SL		3
	134143	H4.3	Softwaretechnik	V/L	2	LKBK	90			3
	134200	H10	Fachliche Vertiefung 1			1-2 Lx 6)	6)			
134201	H10.1	Vertiefungsfächer aus Tabelle 4	V/Ü/L	4					5	
Summen 3. Semester						26	7	1		30
4	134110	H1	Regelungstechnik und mathematische Methoden							
	134113	H1.3	Regelungstechnik	V/Ü	4	LK	120			4
	134114	H1.4	Labor Regelungstechnik	L	2			SL		2
	134120	H2	Robotik, Sensorik und Aktorik							
	134122	H2.2	Labor Messtechnik	L	2	LL				3
	134123	H2.3	Elektrische Antriebssysteme	V/Ü	4	LK	120			5
	134124	H2.4	Industrieroboter	V/L	4	LA				5
	134130	H3	Konstruktion							
	134132	H3.2	Festigkeitslehre	V/Ü	2	LK	90			2
	134133	H3.3	Maschinenelemente 2	V/Ü	2			SE		2
	134140	H4	Informationstechnik							
	134144	H4.4	Grundlagen der Netzwerktechnik	V/Ü	2	LK	60			2
134210	H11	Fachliche Vertiefung 2			1-2 Lx 6)	6)				
134211	H11.1	Vertiefungsfächer aus Tabelle 4	V/Ü/L	4					5	
Summen 4. Semester						26	7	2		30
5	134150	H5	Praktisches Studiensemester							
	134151	H5.1	Betreute Praxisphase					SA		26
	134152	H5.2	Kolloquien begleitend zum praktischen Studiensemester	S	1			SR		4
Summen 5. Semester						1	0	2		30

Table 3.1 (continued): Main Study Period following the Basic Study Period in German

6	134160	H6	Seminararbeit							
	134161	H6.1	Seminararbeit / Projekt	L/S	1	LE				8
	134170	H7	Fachübergreifende Qualifikation							
	134171	H7.1	Studium Generale 1)		2					2
	134172	H7.2	Einführung in die Betriebswirtschaftslehre	V/Ü	2	LK	60			2,5
	134173	H7.3	Integrierte Produktentwicklung	V/Ü	2	LK	60			2,5
	134180	H8	Vertiefte Grundlagen							
	134181	H8.1	Technische Physik	V/Ü	2	LK	90			2,5
	134182	H8.2	Digitale Signalverarbeitung	V/Ü	2	LK	90			2,5
	134220	H12	Fachliche Vertiefung 3				1-2 Lx 6)	6)		
	134221	H12.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5	V/Ü/L	4					5
	134230	H13	Fachliche Vertiefung 4				1-2 Lx 6)	6)		
	134231	H13.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5	V/Ü/L	4					5
Summen 6. Semester					19	7		0		30

7	134170	H7	Fachübergreifende Qualifikation							
	134174	H7.4	Projektplanung	Ü	1	PA				3
	134190	H9	Vertiefte Informationstechnik							
	134191	H9.1	Mensch-Maschine-Systeme	V/Ü	2	LA				2,5
	134192	H9.2	Digitale Produktion	V/Ü	2	LK	60			2,5
	134240	H14	Fachliche Vertiefung 5				1-2 Lx 6)	6)		
	134241	H14.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5	V/Ü/L	4					5
	134250	H15	Fachliche Vertiefung 6				1-2 Lx 6)	6)		
	134251	H15.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5	V/Ü/L	4					5
	134260	H16	Bachelor Thesis							
134261	H16.1	Bachelor Thesis / Projekt		1	PB				12	
Summen 7. Semester					14	6		0		30

Summen Hauptstudium					86	29		3		150
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Summen Bachelor					146	43		7		210
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1) Students are required to select an elective course from the range of courses offered by the "Studium Generale" focusing on "Ethics, Environment and Sustainability". These courses are subject to the regulations of the "Studium Generale".

6) To achieve the required ECTS credits, students must take and pass the respective examination.

3.1.2 Courses after the Basic Study Period in English

Table 3.2 below shows the courses of the Main Study Period (“Hauptstudium”) following the Basic Study Period in English.

Table 3.2: Main Study Period following the Basic Study Period in English

Sem.	Course					Examination / assessment		Preliminary examination / assessment		ECTS credits
	No.	Module	Title	Type	No. of hours per week (SWS)	Type	Duration (in min.)	Type	Duration (in min.)	
3	134610	H1	Regelungstechnik und mathematische Methoden (Control engineering and mathematical methods)							
	134611	H1.1	Mathematik 3 (Mathematics 3)	V/Ü	4	LK	120			4
	134612	H1.2	Signale und Systeme (Signals and systems)	V/Ü	4	LK	120			4
	134620	H2	Robotik, Sensorik und Aktorik (Robotics, sensors and actuators)							
	134621	H2.1	Messtechnik und Sensorik (Measurement and sensor technology)	V/Ü	4	LK	120			4
	134630	H3	Konstruktion (Engineering design)							
	134631	H3.1	Computer-Aided Design (CAD)	V/L	4	LE				4
	134640	H4	Informationstechnik (Information technology)							
	134641	H4.1	Mikrocontroller (Microcontrollers)	V/L	2	LKBK	90			3
	134642	H4.2	Labor Elektronik (Electronic engineering lab)	L	2			SL		3
	134643	H4.3	Softwaretechnik (Software engineering)	V/L	2	LKBK	90			3
	134700	H10	Fachliche Vertiefung 1 (Advanced topics 1)							
	134701	H10.1	Technische Mechanik 2 (Mechanical engineering 2)	V/Ü	4	LK	120			4
134702	H10.2	Labor Elektrotechnik 1 (Electrical engineering lab 1)	L	1			SL		1	
Total Semester 3					27	7		2		30
4	134610	H1	Regelungstechnik und mathematische Methoden (Control engineering and mathematical methods)							
	134613	H1.3	Regelungstechnik (Control engineering)	V/Ü	4	LK	120			4
	134614	H1.4	Labor Regelungstechnik (Control engineering lab)	L	2			SL		2
	134620	H2	Robotik, Sensorik und Aktorik (Robotics, sensors and actuators)							
	134622	H2.2	Labor Messtechnik (Measurement technology lab)	L	2	LL				3
	134623	H2.3	Elektrische Antriebssysteme (Electrical actuators)	V/Ü	4	LK	120			5
	134624	H2.4	Industrieroboter (Industrial robots)	V/L	4	LA				5
	134630	H3	Konstruktion (Engineering design)							
	134632	H3.2	Festigkeitslehre (Strength of materials)	V/Ü	2	LK	90			2
	134633	H3.3	Maschinenelemente 2 (Machine parts 2)	V/Ü	2			SE		2
	134640	H4	Informationstechnik (Information technology)							
	134644	H4.4	Grundlagen der Netzwerktechnik (Network technology)	V/Ü	2	LK	60			2
	134710	H11	Fachliche Vertiefung 2 (Advanced topics 2)							
	134711	H11.1	Maschinenelemente 1 (Machine parts 1)	V/Ü	2	LK	60			2
134712	H11.2	Spanende und Abtragende Fertigungsverfahren (Machining and abrasive manufacturing processes)	V/Ü	2	LK	60			2	
134713	H11.3	Labor Elektrotechnik 2 (Electrical engineering lab 2)	L	1			SL		1	
Total Semester 4					27	8		3		30
5	134650	H5	Praktisches Studiensemester (Internship)							
	134651	H5.1	Betreute Praxisphase (Supervised internship)					SA		26
	134652	H4.4	Kolloquien begleitend zum praktischen Studiensemester (Seminars to complement the internship)	S	1			SR		4
Total Semester 5					1	0		2		30

Table 3.2 (continued): Main Study Period following the Basic Study Period in English

6	134660	H6	Seminararbeit (Seminar paper)								
	134661	H6.1	Seminararbeit / Projekt (Seminar paper / project)	L/S	1	LE					8
	134670	H7	Fachübergreifende Qualifikation (Interdisciplinary qualification)								
	134671	H7.1	Studium Generale 1)		2						2
	134672	H7.2	Einführung in die Betriebswirtschaftslehre (Introduction to Business Administration)	V/Ü	2	LK	60				2,5
	134673	H7.3	Integrierte Produktentwicklung (Integrated product development)	V/Ü	2	LK	60				2,5
	134680	H8	Vertiefte Grundlagen								
	134681	H8.1	Technische Physik (Engineering physics)	V/Ü	2	LK	90				2,5
	134682	H8.2	Digitale Signalverarbeitung (Digital signal processing)	V/Ü	2	LK	90				2,5
	134720	H12	Fachliche Vertiefung 3 (Advanced topics 3)				1-2 Lx 6)	6)			
	134721	H12.1	Technische Wahlfächer aus Tabelle 4 (Technical electives / Table 4)	V/Ü/L	4						5
	134730	H13	Fachliche Vertiefung 4 (Advanced topics 4)				1-2 Lx 6)	6)			
	134731	H13.1	Technische Wahlfächer aus Tabelle 4 (Technical electives / Table 4)	V/Ü/L	4						5
Total Semester 6					19	7		0		30	

7	134670	H7	Fachübergreifende Qualifikation								
	134674	H7.4	Projektplanung	Ü	1	PA					3
	134690	H9	Vertiefte Informationstechnik								
	134691	H9.1	Mensch-Maschine-Systeme	V/Ü	2	LA					2,5
	134692	H9.2	Digitale Produktion	V/Ü	2	LK	60				2,5
	134740	H14	Fachliche Vertiefung 5				1-2 Lx 6)	6)			
	134741	H14.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5	V/Ü/L	4						5
	134750	H15	Fachliche Vertiefung 6				1-2 Lx 6)	6)			
	134751	H15.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5	V/Ü/L	4						5
	134760	H16	Bachelor Thesis								
134761	H16.1	Bachelor Thesis / Projekt		1	PB					12	
Total Semester 7					14	6		0		30	

Total Main Study Period					88	28		7		150
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Total Bachelor					146	41		13		210
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1) Students are required to select an elective course from the range of courses offered by the "Studium Generale" focusing on "Ethics, Environment and Sustainability". These courses are subject to the regulations of the "Studium Generale".

6) To achieve the required ECTS credits, students must take and pass the respective examination.

3.1.3 Advanced courses and technical electives

Advanced courses with a total of at least 10 ECTS credits must be selected from Table 4 below.

Table 4: Advanced courses

Course					Examination / Assessment		Preliminary examination / Assessment		ECTS credits
No.	Module	Title	type	No. of hours per week (SWS)	type	duration (in min.)	type	duration (in min.)	
134271	H10	Projektlabor (Project lab)	L	2	LL				2,5
134272		Kunststofftechnik (Plastics engineering)	V/Ü	4	LK	120			5
134273		Systeme der Mechatronik (Mechatronic systems)	V	2	LK	60			2,5
134274		Elektronische Systeme (Electronic systems)	V/L	4	LA				5
134275		Fortgeschrittene Regelungstechnik (Advanced control engineering)	V/Ü	4	LK	120			5
134276		Vernetzte Systeme (Network systems)	V/Ü	2	LK	60			2,5
134277		Kinematik und Kinetik von Robotern (Robot kinematics and kinetics)	V/Ü	4	LK	120			5
134278		Handhabungs- und Montagetechnik (Handling and assembly technology)	V/Ü	2	LK	60			2,5
134279		Vertiefungsfach 1 einer anderen Hochschule (Advanced course of another university) 2)	V/Ü/L	4-6	Lx 6)	6)			5
134280		Vertiefungsfach 2 einer anderen Hochschule (Advanced course of another university) 2)	V/Ü/L	4-6	Lx 6)	6)			5

2) For 134279 and 134280 "Vertiefungsfach einer anderen Hochschule" (Advanced course of another university), students can choose Engineering, Information Technology or Natural Sciences courses from a Bachelor's programme (Level 6 of the German Qualifications Framework) at another university. The courses should take into account the goals (in terms of competence) of the programme. In case of doubt, approval of the responsible examination board is required. The same courses may not be accredited more than once.

6) To achieve the required ECTS credits, the student must take and pass the respective examinations.

Table 5: Technical electives

Course					Examination / Assessment		Preliminary examination / Assessment		ECTS credits
No.	Module	Title	type	No. of hours per week (SWS)	type	duration (in min.)	type	duration (in min.)	
134291	H12, H13, H14 and H15	Mechanismen und Getriebe (Mechanisms and gears)	VÜ	4	LM				5
134292		Technische Optik (Technical optics)	V/L	4	LA				5
134293		Sicherheit und Zuverlässigkeit (Safety and reliability)	VÜ	2	LA				2,5
134294		Grundlagen der Faserverbundwerkstoffe (Fundamental principles of fibre composites)	V	2	LK	60			2,5
134295		Automatisierungstechnik (Automation technology)	V/L	4	LA				5
134296		Mikrosystemtechnik (Microsystems technology)	VÜ	4	LK	120			5
134297		Technische Akustik (Technical acoustics)	V/L	4	LA				5
134298		Bionik (Bionics)	V/L	4	LA				5
134299		Flexible Fertigung (Flexible manufacturing)	V/L	4	LA				5
134300		Nachhaltige Produktenwicklung (Sustainable product development)	V/L	4	LA				5
134301		Technisches Englisch (Technical English for engineers)	S	2	LR				2,5
134302		Qualitätsmanagement (Quality management)	V	2	LK	60			2,5
134303		Führen von Teams (Team management)	S	2	LA				2,5
134304		Ausgewählte Kapitel der Mechatronik (Selected chapters of mechatronics)	VÜ	2	LK	60			2,5
134305		Ausgewählte Kapitel der Robotik (Selected chapters of robotics)	VÜ	2	LK	60			2,5
134306		Ausgewählte Kapitel der Mechatronik und Robotik (Selected chapters of mechatronics and robotics)	VÜ	4	LK	120			5
134307		Simulationstechnik (Simulation technology)	V/L	4	LK	120			5
134308		Modellbildung (Modeling)	VÜ	2	LK	90			2,5
134309		Projektmanagement (Projekt management)	L	2	LA				2,5
134310		Schaltungsentwicklung (Circuit design)	V/L	4	LKBK	120			5
134311		EMV (EMC)	VÜ	2	LK	60			2,5
134312		Modellbasierte Softwareentwicklung (Model-based software development)	V/L	4	LKBK	90			5
134313		Dynamische Bildverarbeitung (Dynamic image processing)	V/L	4	LA				5
134314		Signalübertragungstechnik (Signal transmission technology)	V	2	LK	60			2,5
134315		Electrical Drives	VÜ	4	LM	20			5
134316		Power Electronics	VÜ	4	LA				5
134317		Digitaltechnik (Digital technology)	V/L	2	LA				2,5
134318		Bildverarbeitung 1 (Image processing 1)	VÜ	2	LK	60			2,5
134319		Software gestütztes Messen (Software-based measurement techniques)	V/L	4	LA				5
134320		Ausgewählte Kapitel der Signalübertragung (Selected chapters of signal transmission)	VÜ	2	LK	60			2,5
134321		Schwingungslehre (Mechanical vibrations)	VÜ	2	LK	60			2,5

134322	H12, H13, H14 und H15	Computational Fluid Dynamics (CFD)	V/Ü	4	LK	120			5
134323		FEM	V/Ü	4	LK	120			5
134324		Werkzeugmaschinen (Machine tools)	V/Ü	4	LK	120			5
134325		Ausgewählte Kapitel der Mathematik 1 (Statistik, DGL) (Selected topics of mathematics 1 – statistics, ODE)	V/Ü	2	LK	60			2,5
134326		Technisches Fach 1 aus der Fakultät T1 3) (Technical subject 1 / Faculty T1)	V/Ü/L	4-6	Lx 6)	6)			5
134327		Technisches Fach 2 aus der Fakultät T1 3)	V/Ü/L	4-6	Lx 6)	6)			5
134328		Technisches Fach 3 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134329		Technisches Fach 4 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134330		Technisches Fach 5 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134331		Technisches Fach 6 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134332		Technisches Fach 1 einer anderen Fakultät der HHN (Technical subject 1 of another faculty at HHN) 4)	V/Ü/L	4-6	Lx 6)	6)			5
134333		Technisches Fach 2 einer anderen Fakultät der HHN 4)	V/Ü/L	2-3	Lx 6)	6)			2,5
134334		Technisches Fach 3 einer anderen Fakultät der HHN 4)	V/Ü/L	2-3	Lx 6)	6)			2,5
134335		Technisches Fach 1 einer anderen Hochschule 5)	V/Ü/L	4-6	Lx 6)	6)			5
134336		Technisches Fach 2 einer anderen Hochschule 5)	V/Ü/L	4-6	Lx 6)	6)			5
134337		Technisches Fach 3 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5
134338		Technisches Fach 4 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5
134339		Technisches Fach 5 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5
134340		Technisches Fach 6 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5

Table 5 (continued): Technical electives

134326	H12, H13, H14 und H15	Technisches Fach 1 aus der Fakultät T1 3)	V/Ü/L	4-6	Lx 6)	6)			5
134327		Technisches Fach 2 aus der Fakultät T1 3)	V/Ü/L	4-6	Lx 6)	6)			5
134328		Technisches Fach 3 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134329		Technisches Fach 4 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134330		Technisches Fach 5 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134331		Technisches Fach 6 aus der Fakultät T1 3)	V/Ü/L	2-3	Lx 6)	6)			2,5
134332		Technisches Fach 1 einer anderen Fakultät der HHN 4)	V/Ü/L	4-6	Lx 6)	6)			5
134333		Technisches Fach 2 einer anderen Fakultät der HHN 4)	V/Ü/L	2-3	Lx 6)	6)			2,5
134334		Technisches Fach 3 einer anderen Fakultät der HHN 4)	V/Ü/L	2-3	Lx 6)	6)			2,5
134335		Technisches Fach 1 einer anderen Hochschule 5)	V/Ü/L	4-6	Lx 6)	6)			5
134336		Technisches Fach 2 einer anderen Hochschule 5)	V/Ü/L	4-6	Lx 6)	6)			5
134337		Technisches Fach 3 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5
134338		Technisches Fach 4 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5
134339		Technisches Fach 5 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5
134340		Technisches Fach 6 einer anderen Hochschule 5)	V/Ü/L	2-3	Lx 6)	6)			2,5

3) 134326 to 134331 "Technische Fächer aus der Fakultät T1" (Technical subjects of the T1 Faculty): Students can choose Engineering, Information Technology or Natural Sciences courses of the T1 Faculty up to a maximum number of 10 ECTS credits that take into account the goals (in terms of competence) of the programme according to Level 6 of the German Qualifications Framework. In case of doubt, approval of the responsible examination board is required. The same courses may not be accredited more than once.

4) 134332 to 134334 "Technische Fächer einer anderen Fakultät der Hochschule" (Technical subjects of another faculty): Students can choose Engineering, Information Technology or Natural Sciences courses of another faculty of this university up to a maximum number of 5 ECTS credits that take into account the goals (in terms of competence) of the programme according to Level 6 of the German Qualifications Framework. In case of doubt, approval of the responsible examination board is required. The same courses may not be accredited more than once.

5) 134335 to 134340 "Technisches Fach einer anderen Hochschule" (Technical subjects of another university): Students can choose Engineering, Information Technology or Natural Sciences courses from a Bachelor's programme (Level 6 of the German Qualifications Framework) of another university up to a maximum number of 10 ECTS credits. The courses should take into account the goals (in terms of competence) of the programme. In case of doubt, approval of the responsible examination board is required. The same courses may not be accredited more than once.

6) To achieve the required ECTS credits, the student must take and pass the respective examinations.

3.2 Module examinations - Main Study Period (“Hauptstudium”)

3.2.1 Module examinations of the Main Study Period following the Basic Study Period in German

Table 6.1 shows the module examinations of the "Bachelorprüfung" (Bachelor's examination), the weighting of the individual examination and module grades and the Bachelor's Thesis following the Basic Study Period in German.

Table 6.1: Module examinations of the "Bachelorprüfung" (Bachelor's examination), weighting of the individual examination and module grades following the Basic Study Period in German

Modulnote Nr.	Bezeichnung der Modulnote						Gewicht der Modulnote für die Note nach § 22	
	Prüfungsleistung			Prüfungsvorleistung				Gewicht der Note der Prüfungsleistung
	Nr.	Modul	Bezeichnung	Nr.	Modul	Bezeichnung		
134110	Regelungstechnik und mathematische Methoden (Modul H1)						14	
	134111	H1.1	Mathematik 3					1
	134112	H1.2	Signale und Systeme					1
	134113	H1.3	Regelungstechnik					1
				134114	H1.4	Labor Regelungstechnik		
134120	Robotik, Sensorik und Aktorik (Modul H2)						17	
	134121	H2.1	Messtechnik und Sensorik					2
	134122	H2.2	Labor Messtechnik					2
	134123	H2.3	Elektrische Antriebssysteme					2
	134124	H2.4	Industrieroboter				2	
134130	Konstruktion (Modul H3)						8	
	134131	H3.1	Konstruieren mit CAD					2
	134132	H3.2	Festigkeitslehre					2
				134133	H3.3	Maschinenelemente 2		
134140	Informationstechnik (Modul H4)						11	
	134141	H4.1	Mikrocontroller					2
				134142	H4.2	Labor Elektronik		
	134143	H4.3	Softwaretechnik					2
	134144	H4.4	Grundlagen der Netzwerktechnik				1	
134160	Seminararbeit (Modul H6)						8	
134170	Fachübergreifende Qualifikation (Modul H7)						8	
				134171	H7.1	Studium Generale 1)		
	134172	H7.2	Einführung in die Betriebswirtschaftslehre					1
	134173	H7.3	Integrierte Produktentwicklung					1
	134174	H7.4	Projektplanung					1
134180	Vertiefte Grundlagen (Modul H8)						5	
	134181	H8.1	Technische Physik					1
	134182	H8.2	Digitale Signalverarbeitung					1
134190	Vertiefte Informationstechnik (Modul H9)						5	
	134191	H9.1	Mensch-Maschine-Systeme					1
	134192	H9.2	Digitale Produktion					1
134200	Fachliche Vertiefung 1 (Modul H10)						5	
	134201	H10.1	Vertiefungsfächer aus Tabelle 4					1
134210	Fachliche Vertiefung 2 (Modul H11)						5	
	134211	H11.1	Vertiefungsfächer aus Tabelle 4					1
134220	Fachliche Vertiefung 3 (Modul H12)						5	
	134221	H12.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5					1
134230	Fachliche Vertiefung 4 (Modul H13)						5	
	134231	H13.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5					1
134240	Fachliche Vertiefung 5 (Modul H14)						5	
	134241	H14.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5					1
134250	Fachliche Vertiefung 6 (Modul H15)						5	
	134251	H15.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5					1
134260	Bachelor Thesis (Modul H16)						12	
	134261	H16.1	Bachelor Thesis / Projekt					1
						Summe	118	

3.2.2 3.2.2 Module examinations of the Main Study Period following the Basic Study Period in English

Table 6.2 shows the module examinations of the "Bachelorprüfung" (Bachelor's examination), the weighting of the individual examination and module grades and the Bachelor's Thesis following the Basic Study Period in English.

Table 6.2: Module examinations of the "Bachelorprüfung" (Bachelor's examination), weighting of the individual examination and module grades following the Basic Study Period in English

Modulnote Nr.	Bezeichnung der Modulnote						Gewicht der Modulnote für die Note nach § 22	
	Prüfungsleistung			Prüfungsvorleistung				
	Nr.	Modul	Bezeichnung	Nr.	Modul	Bezeichnung		
134610	Regelungstechnik und mathematische Methoden (Modul H1)						14	
	134611	H1.1	Mathematik 3					1
	134612	H1.2	Signale und Systeme					1
	134613	H1.3	Regelungstechnik					1
				134614	H1.4	Labor Regelungstechnik		
134620	Robotik, Sensorik und Aktorik (Modul H2)						17	
	134621	H2.1	Messtechnik und Sensorik					2
	134622	H2.2	Labor Messtechnik					2
	134623	H2.3	Elektrische Antriebssysteme					2
	134624	H2.4	Industrieroboter					2
134630	Konstruktion (Modul H3)						8	
	134631	H3.1	Konstruieren mit CAD					2
	134632	H3.2	Festigkeitslehre					2
				134633	H3.3	Maschinenelemente 2		
134640	Informationstechnik (Modul H4)						11	
	134641	H4.1	Mikrocontroller					2
				134642	H4.2	Labor Elektronik		
	134643	H4.3	Softwaretechnik					2
134644	H4.4	Grundlagen der Netzwerktechnik				1		
134660	Seminararbeit (Modul H6)						8	
134670	Fachübergreifende Qualifikation (Modul H7)						8	
				134671	H7.1	Studium Generale 1)		
	134672	H7.2	Einführung in die Betriebswirtschaftslehre					1
	134673	H7.3	Integrierte Produktentwicklung					1
	134674	H7.4	Projektplanung					1
134680	Vertiefte Grundlagen (Modul H8)						5	
	134681	H8.1	Technische Physik					1
	134682	H8.2	Digitale Signalverarbeitung					1
134690	Vertiefte Informationstechnik (Modul H9)						5	
	134691	H9.1	Mensch-Maschine-Systeme					1
	134692	H9.2	Digitale Produktion					1
134700	Fachliche Vertiefung 1 (Modul H10)						5	
	134701	H10.1	Technische Mechanik 2					1
				134702	H10.2	Labor Elektrotechnik 1		
134710	Fachliche Vertiefung 2 (Modul H11)						5	
	134711	H11.1	Maschinenelemente 1					1
	134712	H11.2	Spanende und Abtragende Fertigungsverfahren					1
				134713	H11.3	Labor Elektrotechnik 2		
134720	Fachliche Vertiefung 3 (Modul H12)						5	
	134721	H12.1	Technische Wahlfächer aus Tabelle 4					1
134730	Fachliche Vertiefung 4 (Modul H13)						5	
	134731	H13.1	Technische Wahlfächer aus Tabelle 4					1
134740	Fachliche Vertiefung 5 (Modul H14)						5	
	134741	H14.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5					1
134750	Fachliche Vertiefung 6 (Modul H15)						5	
	134751	H15.1	Technische Wahlfächer aus Tabelle 4 oder Tabelle 5					1
134760	Bachelor Thesis (Modul H16)						12	
	134761	H16.1	Bachelor Thesis / Projekt					1
						Summe	118	

3.3 Bachelor's degree examination

The degree certificate includes the grades of the modules as listed in table 6.1 and 6.2 and the grade of the Bachelor's thesis. The grade of each module is calculated based on the weighted average grades of the credit value of each individual examination. The final grade of the "Bachelorzeugnis" (Bachelor's degree certificate) is calculated based on the weighted average grade in the individual modules and the final grade of the Bachelor's Thesis. The weightings of the individual grades are set out in Table 6.1 and 6.2.

3.4 Prerequisites

3.4.1 Prerequisites for the Main Study Period following the Basic Study Period in German

To participate in 134131 "Konstruieren mit CAD" (Computer-Aided Design), students must have passed the following courses: 134066 "Grundlagen des Entwickelns/Arbeitstechnik/Technisches Zeichnen" (Fundamentals of Engineering Design/Working Techniques/Technical Drawing) and 134065 "Maschinenelemente" (Machine Parts 1)

Proof of successful completion of the internship must be provided at the latest upon delivery of the Bachelor's Thesis.

All other preliminary examinations of the main study period must be completed before the Bachelor's degree certificate is issued.

3.4.2 Prerequisites for the Main Study Period following the Basic Study Period in English

To be admitted to the Main Study Period after completion of the Basic Study Period in English, module 134580 "Languages" must be successfully completed.

To participate in 134631 "Konstruieren mit CAD" (Computer-Aided Design), students must have passed the course 134567 Engineering Design 1 / Engineering Drawing.

In order to be eligible for the 134650 "Praktisches Studiensemester" (internship), students must prove that they have the requisite level of German language proficiency according to section 4 para. 2(3)(2) of the Admission and Enrolment Regulations of Heilbronn University.

Proof of successful completion of the internship must be provided at the latest upon delivery of the Bachelor's Thesis.

All preliminary examinations of the Main Study Period must be completed before the Bachelor's degree certificate is issued.

3.5 Internship

The requirements for the accreditation of the internship and the office in charge of accreditation are specified in the general section of these Study and Examination Regulations (§ 4(7)(2)).

Goal:

The aim of an internship is to allow students to gain hands-on experience and an insight into the role and tasks of engineers. To this end, you may either follow the recommendations below or, with the approval of the "Praktikantenamt" (Interns' Office) of the Faculty of Mechatronics and Microsystems Engineering, focus on one particular area of work.

Scope:

Depending on a company's resources and facilities, students should work in the following areas:

- Single-part, component and device manufacturing
- Production, production planning and production control
- Research and development in a laboratory setting

Students are strongly encouraged to complete a practical semester abroad.

3.6 Specific regulations for cooperative education models during the term of the contract between the cooperation company and the student

Students enrolled in a cooperative program are required to work for their respective employer during the semester breaks and periods without exams, unless entitled to paid holidays. During this time, students should complete activities designed to maximise their learning on the job and consolidate their skills, enabling them to gain in-depth knowledge of the work and methods of engineers.

Their activities should comprise engineering tasks that encourage them to work as independently and responsibly as possible while addressing and solving specific problems in the following areas:

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

The focus depends on the company's resources and facilities and the scope of the programme.

The complexity of the tasks should be tailored to the student's individual progress, thus enabling the student to learn, apply and consolidate his/her knowledge through hands-on experience.

4 Effective date

These Study and Exam Regulations ("SPO 1") shall enter into force on 01/09/2017.

Heilbronn, ...

Prof. Dr.-Ing. Jürgen Schröder
- Vice-Chancellor -

Public announcement

In accordance with the "Bekanntmachungssatzung der Hochschule Heilbronn" (Publication scheme of the University of Applied Sciences Heilbronn) of 8 December 2010, these regulations are hereby made publicly available.

...

Heilbronn, xx.xxxxxxxxxxxx.xxxx
Head of Academic Department

List of abbreviations

Type of course:

V = Lecture L = Laboratory S = Seminar Ü = Exercise

Type of examinations/assessments:

LA = course-related practical work

LK = course-related written exam

LKBK = assignments during the course and final written exam (combined)

LL = course-related lab work

LR = course-related presentation

PA = interdisciplinary assignments during the course

PB = Bachelor's Thesis

Type of preliminary examinations/assessments:

SK = preliminary written examination

SA = preliminary assessment: practical work

SL = preliminary assessment: lab work

SR = preliminary assessment: presentation

SKBK = preliminary assessment: assignments during the course and final written exam (combined)