HOCHSCHULE HEILBRONN

Bachelor's degree programme: Artificial Intelligence and Industrial Digitalisation (KID-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

§ 7

Bachelor's
Artificial Intelligence and Industrial Digitalisation (KID-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 **130** 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 ECTS credits.

1.3 Language of instruction

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 your admission status, the basic studies must be completed in either German or English.

2 Basic studies

2.1 Basic studies in German

2.1.1 Subjects in German

The courses in the basic studies 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	**608010**	**Mathematics 1**			LK	90			
		608011	Mathematics 1	V/Ü	6	Module examination				5
	G3	**608030**	**Physics**			LK	90			
		608031	Physics	V/Ü	4	Module examination				5
	G4	**608040**	**Computer Science 1**			LK	90			
		608041	Computer Science 1	V/Ü	4	Module examination				5
	G6	**608060**	**Electrical Engineering 1**			LK	90			
		608061	Electrical Engineering 1	V/Ü	4	Module examination				5
	G8	**608080**	**Technical Mechanics 1**			LK	60			
		60	Technical Mechanics 1	V/Ü	4	Module examination				5
	G10	**608100**	**Fundamentals of design and manufacturing**			LK	12			
		608101	Fundamentals of Design and Manufacturing	V/Ü	4	Module examination				5
Total 1st semester					**26**	**6**		**0**		**30**
2	G2	**608020**	**Mathematics 2**			LK	90			
		608021	Mathematics 2	V/Ü	4	Module examination				5
	G5	**608050**	**Computer Science 2**			LK	120			
		608051	Computer Science 2	V/Ü	4	Module examination				5
	G7	**608070**	**Electrical Engineering 2**			LK	90			
		608071	Electrical Engineering 2	V/Ü	4	Module examination				5
	G9	**608090**	**Technical Mechanics 2 and 3**			PK	120			
		608091	Technical Mechanics 2	V/Ü	2	Module examination				2.5
		608092	Technical Mechanics 3	V/Ü	2	Module examination				2.5
	G11	**608110**	**Automation technology**			LK	90			
		608111	Automation technology	V/Ü	4	Module examination				5
	G12	**608120**	**Fundamentals of Digital Technology & Computer Architectures**			LK	90			
		608121	Fundamentals of Digital Technology & Computer Architectures	V/Ü	4	Module examination				5
Total 2nd semester					**24**	**6**		**0**		**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 examinations of the German basic studies

The module examinations for the basic study programme are listed in Table 2.2:

Table 2.2: Module examinations of the Bachelor's preliminary examination, Weighting of the grades for the individual examination components and module grades

Module grades for the basic study programme: Artificial Intelligence and Industrial Digitalisation (KID)					
Module	**No**	**Module**			**Weighting of the module grade for the grade according to § 22**
		Examination	**No**	**Prerequisite**	
Mathematical and scientific fundamentals					
G1	**608010**	**Mathematics 1**			**5**
	608011	Mathematics 1			
G2	**608020**	**Mathematics 2**			**5**
	608021	Mathematics 2			
G3	**608030**	**Physics**			**5**
	608031	Physics			
Computer science					
G4	**608040**	**Computer Science 1**			**5**
	608041	Computer Science 1			
G5	**608050**	**Computer Science 2**			**5**
	608051	Computer Science 2			
Electrical Engineering					
G6	**608060**	**Electrical Engineering 1**			**5**
	608061	Electrical Engineering 1			
G7	**608070**	**Electrical Engineering 2**			**5**
	608071	Electrical Engineering 2			
Technical Mechanics					
G8	**608080**	**Technical Mechanics 1**			**5**
	608081	Technical Mechanics 1			
G9	**608090**	**Technical Mechanics 2 and 3**			**5**
	608091	Technical Mechanics 2			
	608092	Technical Mechanics 3			
Construction					
G10	**608100**	**Fundamentals of Design and Manufacturing**			**5**
	608101	Fundamentals of Design and Manufacturing			
Automation and digital technology / computer architectures					
G11	**608110**	**Automation technology**			**5**
	608111	Automation technology			
G12	**608120**	**Fundamentals of Digital Technology & Computer Architectures**			**5**
	608121	Fundamentals of Digital Technology & Computer Architectures			
Total					**60**

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 below.

Table 2.3: Basic studies in English

Semester	Course					Examination		Prerequisite		ECTS
	Module	No	Course title	Type	SWS	Type	Duration	Type	Duration	
1	G1	**608510**	**Mathematics 1**			LK	90			
		608511	Mathematics 1	V/Ü	6	Module examination				5
	G3	**608530**	**Physics**			LKBK	90			
		608531	Physics	V/Ü	4	Module examination				5
	G4	**608540**	**Electrical Engineering and Electronics 1**			LK	90			
		608541	Electrical Engineering and Electronics 1	V/Ü	4	Module examination				5
	G6	**608560**	**Programming 1**			LK	90			
		608561	Programming 1	V/L	4	Module examination				5
	G8	**608580**	**Engineering Mechanics 1**			LK	60			
		608581	Engineering Mechanics 1	V/Ü	4	Module examination				5
	G11	**608610**	**German Language and Academic Skills 1** [1)]			LP				
		608611	German Language and Academic Skills 1	V/S	4	Module examination				5
Total 1st semester					**26**	**6**		**0**		**30**
2	G2	**608520**	**Mathematics 2**			LK	120			
		608521	Mathematics 2	V/Ü	4	Module examination				5
	G5	**608550**	**Electrical Engineering and Electronics 2**							
		608551	Electrical Engineering and Electronics 2	V/Ü	2	LK	9			2.5
		608552	Electrical Engineering Laboratory	L/S	2			SL		2.5
	G7	**608570**	**Programming 2**			LK	120			
		608571	Programming 2	V/L	4	Module examination				5
	G9	**608590**	**Engineering Mechanics 2 and 3**			PK	120			
		608591	Engineering Mechanics 2	V/Ü	2	Module examination				2.5
		608592	Engineering Mechanics 3	V/Ü	2	Module examination				2.5
	G10	**608600**	**Materials**			PK	90			
		608601	Materials: Plastics	V/Ü	2	Module examination				2.5
		608602	Materials: Metals	V/Ü	2	Module examination				2.5
	G12	**608620**	**German Language and Academic Skills 2** [2)]			LP				
		608621	German Language and Academic Skills 2	V/S	4	Module examination				5
Total 2nd semester					**24**	**6**		**1**		**30**

[1)] *608610 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 Certificate B1, DSD I or equivalent

[2)] *608620 German Language and Academic Skills 2*: Written and oral knowledge of German at level B2, proven by a written examination (with an oral part if necessary), e.g. telc B2, Goethe Zertifikat B2, DSD II, TestDaF 3, DSH 1 or equivalent; see also point 3.5

2.2.2 Module examinations of the basic English course

The module examinations of the basic studies are listed in Table 2.4 below:

Table 2.4: Module examinations of the Bachelor's preliminary examination, Weighting of the grades for the individual examination components and module grades

Module grades for the basic studies in English: Artificial Intelligence and Industrial Digitalisation (KID)					
Module	**No.**	**Module name**			**Weighting of the module grade for the grade according to § 22**
		Examination	**No**	**Prerequisite**	
Mathematics and Physics					
G1	**608510**	**Mathematics 1**			**5**
	608511	Mathematics 1			
G2	**608520**	**Mathematics 2**			**5**
	608521	Mathematics 2			
G3	**608530**	**Physics**			**5**
	608531	Physics			
Electrical Engineering					
G4	**608540**	**Electrical Engineering and Electronics 1**			**5**
	608541	Electrical Engineering and Electronics 1			
G5	**608550**	**Electrical Engineering and Electronics 2**			**5**
	608551	Electrical Engineering and Electronics 2			
			608552	Electrical Engineering Laboratory	
Programming					
G6	**608560**	**Programming 1**			**5**
	608561	Programming 1			
G7	**608570**	**Programming 2**			**5**
	608571	Programming 2			
Engineering Mechanics					
G8	**608580**	**Engineering Mechanics 1**			**5**
	608581	Engineering Mechanics 1			
G9	**608590**	**Engineering Mechanics 2 and 3**			**5**
	608591	Engineering Mechanics 2			
	608592	Engineering Mechanics 3			
G10	**608600**	**Materials**			**5**
	608601	Materials: Plastics			
	608602	Materials: Metals			
German and Academic Skills					
G11	**608610**	**German Language and Academic Skills 1**			**5**
	608611	German Language and Academic Skills 1			
G12	**608620**	**German Language and Academic Skills 2**			**5**
	608621	German Language and Academic Skills 2			
Total					**60**

2.3 Bachelor's preliminary examination

The preliminary examination for the German and English basic studies comprises the module grades for all modules listed in Table 2.2 (German) or Table 2.4 (English). If several performance assessments take place at 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 Subject

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

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	**608210**	**Industrial digitalisation**			LK	90			
		608211	Industrial digitalisation	V/Ü	4	Module examination				5
	H	**608220**	**Motion Control with Laboratory**			LKBK	90			
		608221	Motion Control with Laboratory	V/Ü	4	Module examination				5
	H5	**608250**	**Networked machines**			LK	90			
		608251	Networked machines	V/Ü	4	Module examination				5
	H6	**608260**	**Measurement technology**							
		608261	Fundamentals of measurement technology	V/Ü	2	LK	6			2.5
		608262	Laboratory for Physical Measurement Technology	L	2			SL		2.5
	H8	**608280**	**Introduction to AI**			LKBK	90			
		608281	Introduction to AI	V/Ü	4	Module exam				5
	H9	**608290**	**Data Science & Applied Mathematics**							
		608291	Data Science	V/Ü	2	Advanced	60			2.5
		608292	Applied Mathematics	V/Ü	2	Advanced	6			2.5
Total 3rd semester					**24**	**7**		**1**		**30**
4	H3	**608230**	**Integrated robotics with laboratory**			LKBK	90			
		608231	Integrated Robotics with Laboratory	V/Ü	4	Module examination				5
	H4	**608240**	**Digital twin**			LKBK	90			
		608241	Digital twin	V/Ü	4	Module examination				5
	H7	**608270**	**Control engineering**			LK	90			
		608271	Control engineering	V/Ü	4	Module examination				5
	H10	**608300**	**Neural Networks & Deep Learning**			LKBK	90			
		608301	Neural Networks & Deep Learning	V/Ü	4	Module examination				5
	H1	**608310**	**Computer Vision**			LA				
		608311	Computer Vision	V/L	4	Module examination				5
	H17	**608370**	**Specialisation 1**							
			Elective subject(s) in accordance with section 3.2		4	Lx				5
Total 4th semester					**24**	**6**		**0**		**30**

5	H14	**608340**	**Practical study semester**								
		608341	Supervised practical phase		0			SA		2	
		608342	Colloquia accompanying the practical study semester.	S	0			SR		4	
Total 5th semester					**0**	**0**		**2**		**30**	

6	H12	**608320**	**ML Tools & Optimisation**			LP					
		608321	ML Tools & Optimisation	V/Ü	4	Module exam				5	
	H1	**608330**	**AI in industrial applications**			LKBK	90				
		608331	AI in industrial applications	V/Ü	4	Module examination				5	
	H1	**608350**	**AI / ID application project**			LP					
		608351	KI / ID application project	V/Ü	4	Module examination				5	
	H1	**608360**	**Law and ethics**								
		608361	Law in Engineering	V/Ü	2	LK	60			2.5	
		608362	Ethics	V/Ü	2			SR		2.5	
	H1	**608380**	**Specialisation 2**								
			Elective subject(s) in accordance with section 3.2		4	Lx				5	
	H1	**608390**	**Specialisation 3**								
			Elective subject(s) in accordance with section 3.2		4	Lx				5	
Total 6th semester					**24**	**6**		**1**		**30**	

7	H20	**608400**	**Specialisation 4**								
			Elective subject(s) in accordance with section 3.2		6	Lx				7.5	
	H2	**608410**	**Applied study**			LA					
		608411	Applied study	Ü	2	Module examination				7.5	
	H22	**608420**	**Bachelor thesis**								
		608421	Colloquium on the Bachelor's thesis	S	0			SR		3	
		608422	Bachelor's thesis		0	PB				12	
Total 7th semester					**8**	**3**		**1**		**30**	

3.2 Elective subjects

To fulfil the **examination requirements for "Specialisation 1-4"**, students select technical electives totalling 22.5 ECTS from the WF catalogue in the fourth, sixth and seventh semesters.

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

The WF catalogue is part of the module handbook and is 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 another programme outside the faculty of Heilbronn University or another university may be recognised upon request. Participation in elective subjects may be limited due to capacity reasons.

Changes to the WF catalogue are approved by the examination board upon request of the teacher 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 credits for subjects are not permitted.

3.3 Module examinations in the main study period

The module examinations of the Bachelor's examination, the associated examination requirements and prerequisites, 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 examinations for the Bachelor's examination, weighting of the grades for the individual examination components and module grades

Module grades for the main study programme: Artificial Intelligence and Industrial Digitalisation (KID)

Module	No	Module			Weighting of the module grade for the grade according to § 29
		Examination	No	Preliminary examination	
Digitalisation and applied automation technology					
H1	**608210**	**Industrial digitalisation**			**5**
	608211	Industrial digitalisation			
H2	**608220**	**Motion control with laboratory**			**5**
	608221	Motion Control with Laboratory			
H3	**608230**	**Integrated robotics with laboratory**			**5**
	608231	Integrated Robotics with Laboratory			
H4	**608240**	**Digital twin**			**5**
	608241	Digital twin			
H5	**608250**	**Networked machines**			**5**
	608251	Networked machines			
H6	**608260**	**Measurement technology**			**5**
	608261	Fundamentals of measurement technology			
			608262	Laboratory physical measurement technology	
H7	**608270**	**Control engineering**			**5**
	608271	Control engineering			
Artificial intelligence, data science, deep learning/machine learning and computer vision					
H8	**608280**	**Introduction to AI**			**5**
	608281	Introduction to AI			
H9	**608290**	**Data Science & Applied Mathematics**			**5**
	608291	Data Science			
	608292	Applied Mathematics			

H10	**608300**	**Neural Networks & Deep Learning**			**5**
	608301	Neural Networks & Deep Learning			
H11	**608310**	**Computer Vision**			**5**
	608311	Computer Vision			
H12	**608320**	**ML Tools & Optimisation**			**5**
	608321	ML Tools & Optimisation			
H13	**608330**	**AI in industrial applications**			**5**
	608331	AI in industrial applications			
Practical study semester					
H1	**608340**	**Practical study semester**			**0**
			608341	Supervised practical phase	
			608342	Colloquia accompanying the practical study semester.	
Application project in the field of AI / ID					
H1	**608**	**AI / ID application project**			**5**
	608351	AI / ID application project			
Law and ethics					
H16	**608360**	**Law and Ethics**			**5**
	608361	Law in Engineering			
			608362	Ethics	
Elective modules and applied study					
H17	**608370**	**Specialisation 1**			**5**
		Elective subject(s) in accordance with section 3.2			
H18	**608380**	**Specialisation 2**			**5**
		Elective subject(s) in accordance with section 3.2			
H19	**608390**	**Specialisation 3**			**5**
		Elective subject(s) in accordance with section 3.2			
H20	**608400**	**Specialisation 4**			**7**
		Elective subject(s) in accordance with Section 3.2			
H21	**608410**	**Applied study**			**7**
	608411	Applied study			
Bachelor thesis					
H22	**608420**	**Bachelor thesis**			**15**
	608421	Colloquium on the bachelor thesis			
	608422	Bachelor thesis			
Total					**120**

3.3.1 Colloquium on the Bachelor's Thesis

The subject of the colloquium on the bachelor thesis is the development of in-depth content from the subject area of the bachelor thesis that goes beyond the scope of the bachelor thesis. The results of the work are presented orally in the course and discussed.

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 an ECTS-weighted arithmetic mean of the individual performances included in the module. The overall grade of 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 requirements

The following admission requirements apply:

The admission requirement for admission to the German-language main **study programme with a foundation course in English is that module *608620 German Language and Academic Skills 2*** has been passed at 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.

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

The compulsory examinations of the 3rd and 4th semesters must be passed before the Bachelor's thesis is issued.

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 Studium-PLUS models during the contract period between the cooperation company and the student

As part of their studies, Studium-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 1) shall enter into force on 1 September 2025.

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