Academic and Examination Regulations for the Bachelor's degree programme Software Design International at Aschaffenburg University of Applied Sciences (SPO B-SDI)

from 1 August 2023

On the basis of Art. 9, Sentence 1, Art. 80, Para. 1 and Art. 84, Para. 2 of the Bavarian Higher Education Innovation Act (BayHIG) of 5 August 2022 (GVBl. p. 414, BayRS 2210-1-3-WK), as amended by § 3 of the Act of 23 December 2022 (GVBl. p. 709), Aschaffenburg University of Applied Sciences hereby enacts the the following statutes:

Content

§ 1 Purpose of the Academic and Examination Regulations

These Academic and Examination Regulations serve to complete and supplement the General Examination Regulations (APO) of the Aschaffenburg University of Applied Sciences dated 14 February 2023 as amended.

§ 2 Qualification Objective - Study Objective

(1) Qualification goal
[1]The English-language degree programme Software Design International is geared towards working in intercultural, multinational software teams in an international environment. [2]Graduates of the degree programme are able to plan, design, implement, test and optimise complex software applications in a human/user-centred and goal-oriented manner. [3]They have basic knowledge of the information technology and mathematical/algorithmic principles required for this as well as profound and broad knowledge of current programming languages and tools, the core components of software applications and their interaction. [4]They can develop and optimise software within the framework of agile software projects in diverse and multinational teams, taking into account user and customer requirements, the optimal design of the human-machine interface and best practices in software development.
[5]In addition to their professional competence in software development and project management, software designers act and communicate in a targeted, confident and target group-appropriate manner within their team and vis-à-vis internal and external stakeholders and actively shape the group-dynamic processes within classic and agile project teams. [6]They are able to set up and professionally manage corresponding projects. [7]Ethical considerations and challenges also shape and guide their actions.
[8]Furthermore, they have a basic understanding of business administration. [9]They understand how IT supports the business of the organisational structure and the process organisation (business process view), as well as how to communicate, organise and implement fundamental innovations in this area.

(2) Activities/occupations
- Development and maintenance of software and software systems
- Quality assurance and process management
- IT system analysis and project planning
- Advice on and distribution of IT systems
- Commissioning and servicing of IT systems
- Monitoring and assessment of IT systems

(3) Professional and methodological skills
- Formal, algorithmic and mathematical competences
- Analysis, design, implementation and project management skills
- Technological competences
- Interdisciplinary competences
- Methodological and transfer competence

§ 3 Standard period of study, structure of the degree programme

(1) [1]The degree programme comprises a standard period of study of seven semesters with six university semesters and one Practical Training Semester. [2]The Practical Training Semester is completed in the fifth semester.

(2) 210 ECTS credits are to be acquired.

(3) [1]In each of the last two semesters of study, specialisations are offered in accordance with the statutes on the specialisations of the engineering degree programmes of the Aschaffenburg University of Applied Sciences and the study plan. [2]One specialisation must be chosen. [3]The choice of the specialisation is made in the course of the fifth semester. [4]If no choice has been made by this time; the faculty will assign the student to the specialisation.

(4) The specialisation taken is stated in the degree certificate.

(5) [1]There is no entitlement to the fact that all the planned specialisations, compulsory elective modules and elective modules are actually offered. [2]Similarly, there is no claim that the associated courses will be held if there are not enough participants.

§ 4 Modules and Certificates of Achievement

(1) [1]The modules and their individual courses, the number of semester hours, the type of courses, the type, scope and contents of the examinations and course-related certificates, the ECTS credits, the grade weights of the final module grades as well as further regulations are specified in the annexes to these statutes. [2]The regulations are supplemented for the specialisations by the statutes on the specialisations for engineering degree programmes at the Aschaffenburg University of Applied Sciences in the currently valid version, and for the general and subject-specific compulsory elective modules by the study plan.

(2) All modules are either compulsory modules, compulsory elective modules or elective modules:
   a) Compulsory modules are those modules of the degree programme that are compulsory for all students.
   b) Compulsory elective modules are those modules that are offered as alternatives, either individually or in groups. Students must make a specific selection from among them in accordance with these Academic and Examination Regulations. The selected modules are treated as compulsory modules.
   c) Elective modules are modules that are not compulsory for achieving the degree objective. They can be additionally selected by students from the range of courses offered by the university.

(3) All courses and examinations are held in English.

§ 5 Credits according to the "European Credit Point Transfer System" (ECTS)

[1]ECTS credits are awarded for all successfully completed modules. [2]The credits result from Annex 1 to these Statutes. [3]One credit point corresponds to a total work performance of the students in attendance and self-study of 30 time hours.

§ 6 Study progress

(1) [1]By the end of the second semester, examinations must be taken in the following modules

- SDI_01 Mathematics I
- SDI_03 Foundations of Programming Technologies
- SDI_07 Foundations of IT-Hardware

(Fundamentals and Orientation Examination). [2]If students exceed the deadline according to sentence 1, the examinations not yet taken are deemed to have been failed for the first time.

(2) Students who have achieved 70 ECTS credits are entitled to enter the Practical Training Semester.

(3) [1]The entry requirement for the specialisations is the achievement of 90 ECTS credits. [2]Deviations from this rule may only be decided by the examination board for compelling reasons; the reasons must be recorded in writing.

§ 7 Curriculum

[1]In order to ensure the range of courses offered and to inform the students, the responsible faculty shall draw up a study plan detailing the course of study. [2]The study plan shall be adopted by the Faculty Council and shall be made public at the university. [3]The announcement of new regulations must be made at the latest at the beginning of the lecture period of the semester in which the regulations are to be applied for the first time. [4]The curriculum shall contain, in particular, regulations and information on

1. the time allocation of the semester hours per module or sub-module and study semester including the ECTS credits to be achieved,
2. the designation of the study specialisations offered and their compulsory and elective modules as well as the number of hours and the course type of these modules,
3. the approved study specialisations,
4. the catalogue of elective compulsory modules and elective modules that can be selected,
5. the type of course and the language of instruction in the individual modules or sub-modules, insofar as they have not been conclusively defined in Annex 1,
6. Form and organisation of the practice and the practice-related courses in the practical semester,
7. more detailed provisions on the performance and participation certificates.

§ 8 Module Handbook

[1]For the information of the students, the responsible faculty shall prepare a module handbook from which the objectives, learning outcomes and study contents of all modules are detailed. [2]The module handbook shall be adopted by the Faculty Council and shall be made public at the university. [3]The announcement of

new regulations must be made at the latest at the beginning of the lecture period of the semester in which the regulations are to be applied for the first time.

§ 9 Academic advising

Students who have achieved less than 35 ECTS credits after two semesters are obliged to consult the student advisory service.

§ 10 Practical Training Semester

(1) One Practical Training Semester is to be carried out.

(2) [1]The Practical Training Semester comprises a minimum of 20 and a maximum of 26 weeks and is deepened and supplemented by the practical courses according to the appendices to these Academic and Examination Regulations. [2]Details of the practical courses are given in the study plan and the module handbook.

(3) The Practical Training Semester has been successfully completed if

1. the required periods of practical experience have been proven by a certificate from the training institution that corresponds to the model provided by the higher education institution, and
2. the practical report has been assessed with the grade "with success" and the required performance records of the practical courses have been successfully completed.

(4) The form and organisation of the practical courses in the Practical Training Semester result from the curriculum.

(5) The internship officer of the degree programme is available to advise students.

§ 11 Credits earned externally

[1]If coursework provided for in these study regulations is completed in collaboration with external institutions, e.g., as part of the Practical Training Semester, the students themselves are responsible for compliance with relevant legal provisions to which the external institution is subject. [2]This applies in particular to compliance with data protection regulations.

§ 12 Overall examination grade

The arithmetic mean of the final grades of all modules weighted with the ECTS credits is used to form the overall examination grade.

§ 13 Bachelor thesis

(1) [1]In the Bachelor's thesis, students should demonstrate their ability to independently apply the knowledge and skills acquired during their studies to complex tasks. [2]Students who have achieved at least 150 ECTS credits can register for the Bachelor's thesis. [3]Topics are assigned by professors at the university. [4]The deadline from issue to submission is five months.

(2) The issue of a topic to several students for joint work is permissible, provided that the individual performance of each student can be clearly delineated and assessed.

(3) The date of issue of the topic will be recorded by the examiner together with the topic.

(4) [1]The study office monitors compliance with the deadlines according to Paragraph 1 and Paragraph 3. [2]If the student does not receive a topic in time, the examination board will arrange for the topic of the Bachelor's thesis to be handed out by an assignment provider.

(5) The written part of the Bachelor's thesis must be submitted to the Office of Student Affairs in two bound copies as well as in a suitable electronic form.

(6) The result of the Bachelor thesis is to be presented in a lecture.

§ 14 Bachelor examination certificate

A certificate is issued for the successful completion of the Bachelor's examination in accordance with the respective model in the Annex to the General Examination Regulations of the Aschaffenburg University of Applied Sciences.

§ 15 Academic Degree

(1) On the basis of the successful completion of the Bachelor's examination, the academic degree "Bachelor of Science", abbreviation: "B.Sc." is awarded.

(2) A certificate shall be issued on the award of the academic degree in accordance with the respective model in the Annex to the General Examination Regulations of Aschaffenburg University of Applied Sciences.

(3) The certificate is accompanied by a "Transcript of Records", which contains the grades achieved, and a Diploma Supplement.

§ 16 Examination board

(1) An examination board for the Bachelor's degree programme shall be formed with 3 members.

(2) The chairing member and the other members are appointed by the Faculty Council for a period of 3 years.

§ 17 Entry into force

These Academic and Examination Regulations come into force on 1 October 2023.

Appendix 1 to the Academic and Examination Regulations for the **Bachelor's Degree Programme Software Design International** at Aschaffenburg University of Applied Sciences

Overview of the modules and credits

A1. 1st-4th semester of study

Module no.	Module name (sub-modules, if applicable)	Type of course	ECTS	SWS[2] Semester				Admission to the Module	Admission to the examination	Type, duration of the examination, partial performance if applicable	Grading	ECTS Weighting
				1	**2**	**3**	**4**					
SDI_01	**Mathematics I**		5	4								1
SDI_01a	Mathematics I	SU		2/4						schrP 90 min	yes	
SDI_01b	Practice for Mathematics I	Ü		2/4								
SDI_02	**Mathematics II**		5		4							1
SDI_02a	Mathematics II	SU			2/4					schrP 90 min	yes	
SDI_02b	Practice for Mathematics II	Ü			2/4							
SDI_03	**Foundations of Programming Technologies**		6	4								1
SDI_03a	Foundations of Programming Technologies	SU		2/4						pr. LN, 90 minutes, (see A 1.4)	yes	
SDI_03b	Practice for Foundations of Programming Technologies	Ü		2/4								
SDI_04	**Object-oriented Concepts**		5		4							1
SDI_04a	Object-oriented Concepts	SU			2/4					pr. LN, 90 minutes, (see A 1.4)	yes	
SDI_04b	Practice for Object-oriented Concepts	Ü			2/4							
SDI_05	**Data Structures and Algorithms**		5			4						1
SDI_05a	Data Structures and Algorithms	SU				2/4				pr. LN with mdlP 15 min (see A 1.2)	yes	
SDI_05b	Practice for Data Structures and Algorithms	Pr / Ü				2/4						
SDI_06	**Project Management**		5	4								1
SDI_06a	Project Management	SU		2/4						pr. LN with mdlP 15 min (see A 1.2)	yes	
SDI_06b	Project for Project Management	Pr / Ü		2/4								

Module no.	Module name (sub-modules, if applicable)	Type of course	ECTS	SWS²				Admission to the Module	Admission to the examination	Type, duration of the examination, partial performance if applicable	Grading	ECTS Weighting
				Semester								
				1	2	3	4					
SDI_07	**Foundations of IT Hardware**		**5**	4								1
SDI_07a	Foundations of IT Hardware	SU		2/4						schrP 90 min	yes	
SDI_07b	Practice for Foundations of IT Hardware	Ü		2/4								
SDI_08	**Multimedia Technology**		**5**	4								1
SDI_08a	Multimedia Technology	SU		2/4						schrP 90 min	yes	
SDI_08b	Practice for Multimedia Technology	Ü		2/4								
SDI_09	**Theoretical Computer Science**		**5**		4							1
SDI_09a	Theoretical Computer Science	SU			2/4					schrP 90 min	yes	
SDI_09b	Practice for Theoretical Computer Science	Ü			2/4							
SDI_10	**Foundations of Software Engineering**		**5**		4							1
SDI_10a	Foundations of Software Engineering	SU			2/4					pr. LN with mdlP 15 min (see A 1.2)	yes	
SDI_10b	Project for Foundations of Software Engineering	Pr / Ü			2/4							
SDI_11	**Databases**		**5**		4							1
SDI_11a	Databases	SU			2/4					Portfolio (see A 1.3)	yes	
SDI_11b	Practice for Databases	Ü			2/4							
SDI_12	**Requirements Engineering and Usability**		**5**			4						1
SDI_12a	Requirements Engineering and Usability	SU				2/4				pr. LN with mdlP 15 min (see A 1.2)	yes	
SDI_12b	Practice for Requirements Engineering and Usability	Ü				2/4						
SDI_13	**Collaboration, Quality and Test**		**5**			4						1
SDI_13a	Collaboration, Quality and Test	SU				2/4				schrP 90 min	yes	
SDI_13b	Practice for Collaboration, Quality and Test	Ü				2/4						

Module no.	Module name (sub-modules, if applicable)	Type of course	ECTS	SWS²				Admission to the Module	Admission to the examination	Type, duration of the examination, partial performance if applicable	Grading	ECTS Weighting
				Semester								
				1	2	3	4					
SDI_14	**Operating Systems and Networks**		**5**			**4**						**1**
SDI_14a	Operating Systems and Networks	SU				2/4				mdlP 15 min	yes	
SDI_14b	Practice for Operating Systems and Networks	Ü				2/4						
SDI_15	**Foundations of Data Science**		**5**			**4**						**1**
SDI_15a	Foundations of Data Science	SU				2/4				schrP 90 min	yes	
SDI_15b	Practice for Foundations of Data Science	Ü				2/4						
SDI_16	**Agile Development Methodologies**		**6**				**4**					**1**
SDI_16a	Agile Development Methodologies	SU					2/4			pr. LN with mdlP 15 min (see A 1.2)	yes	
SDI_16b	Project for Agile Development Methodologies	Pr / Ü					2/4					
SDI_17	**Human Computer Interaction**		**5**				**4**					**1**
SDI_17a	Human Computer Interaction	SU					2/4			Portfolio (see A 1.1)	yes	
SDI_17b	Practice for Human Computer Interaction	Ü					2/4					
SDI_18	**IT Security**		**5**				**4**					**1**
SDI_18a	IT Security	SU					2/4			schrP 90 min	yes	
SDI_18b	Practice for IT Security	Ü					2/4					
SDI_19	**Software Architecture and Design Patterns**		**5**				**4**					**1**
SDI_19a	Software Architecture and Design Patterns	SU					2/4			schrP 90 min	yes	
SDI_19b	Practice for Software Architecture and Design Patterns	Ü					2/4					
SDI_20	**Parallel and Distributed Systems**		**5**				**4**					**1**
SDI_20a	Parallel and Distributed Systems	SU					2/4			mdlP 15 min	yes	
SDI_20b	Practice for Parallel and Distributed Systems	Ü					2/4					

Module no.	Module name (sub-modules, if applicable)	Type of course	ECTS	SWS[2] Semester				Admission to the Module	Admission to the examination	Type, duration of the examination, partial performance if applicable	Grading	ECTS Weighting
				1	2	3	4					
SDI_21	**German as foreign language A2** (see A 1.5.)		9	4	5							1
SDI_21a	German as foreign language A2.1	SU/Ü	4	4						LN[1)]	yes	4/8
SDI_21b	German as foreign language A2.2	SU/Ü	4		4					LN[1)]	yes	4/8
SDI_21c	Introduction to the German labour market	SU	1		1					TN	mE/oE	
SDI_22	**German as foreign language B1** (see A 1.5.)	**SU/Ü**	**4**			**4**				**LN[1)]**	**yes**	**1**
SDI_23	**Business Administration**	**SU/Ü**	**5**			**4**				**schrP 90 min**	**yes**	**1**
	Total SWS (1st - 4th sem.)		96	24	24	24	24					
	Total ECTS (1st - 4th sem.)		120	30	30	30	30					

Special regulations on module examinations:

A 1.1 The portfolio is made up of several written assignments. The partial performances are to be submitted on specific due dates in self-directed work and should not exceed a total of 30 pages. The individual partial performances can complement and balance each other out. The required number of partial performances to be successfully completed and the due dates are announced by the lecturer at the beginning of the semester.

A 1.2 The graded performance record for the modules SDI_05, SDI_06, SDI_10, SDI_12 and SDI_16 is a practical performance record. During the semester, a project is carried out in consultation with the lecturer. The project is worked on in groups of 4 to 5 students. The project results are summarised in a project report (5-10 pages), the individual parts are marked and the project report is handed in on time. The final grade is formed on the basis of the project results, the examined project report and an individual oral examination of 15 min. or a presentation at the end of the semester (see column "Type of examination" in the table for section A.1).

A 1.3: The graded performance record for the module SDI_11 is a portfolio consisting of the following 3 parts:
- Practical performance: During the semester, a project is carried out in consultation with the lecturer. The project is worked on in groups of 4 to 5 students.
- Report: The project results are summarised in a project report (5-10 pages), the individual parts are marked and the project report is handed in on time.
- Presentation or oral exam at the end of the semester (the exact arrangement will be announced at the beginning of the semester)

The final grade is formed on the basis of the above three parts (project result, project report, presentation or oral examination). (see column "Type of examination" in table to section A.1)

A 1.4: The practical performance record includes writing programme code and answering technical questions.

A 1.5: The (sub-)modules SDI_21a, SDI_21 and SDI_22b build on each other in terms of content. In the first sub-module, the German level A2.1 should be achieved, in the second sub-module the German level A2.2 and in the

module SDI_22 the German level B1.1.

Students who can already prove the German level intended for the respective (sub)module at the beginning of a semester can alternatively take a general science or a subject-specific compulsory elective module and include it in the overall grade. In total, the (sub)modules SDI_21a, SDI_21b and SDI_22 can be completely replaced, with a maximum of 8 ECTS credits each by general or subject-specific compulsory elective modules. The regulations for module SDI_28 in Annexes 1 and 2 to these regulations apply accordingly to the substitute modules.

A 2: Fifth to seventh semester of study

| Module no. | Module name (partial modules, if applicable) | Type of course | ECTS | SWS[2] Semester | | | Admission to the Module | Admission to the examination | Type, duration of the examination, partial performance if applicable | Grading | ECTS Weighting |
				5	6	7					
SDI_25	**Mobile Applications and Development**		**5**		**4**						1
SDI_25a	Mobile Applications and Development	SU			2/4				pr. LN, 90 minutes, (see A 1.4)	yes	
SDI_25b	Practice for Mobile Applications and Development	Ü			2/4						
SDI_26	**Web Technologies**		**5**		**4**						1
SDI_26a	Web Technologies	SU			2/4				pr. LN, 90 minutes, (see A 1.4)	yes	
SDI_26b	Practice for Web Technologies	Ü			2/4						
SDI_27	**Software Development Project**		**10**		**2**						1
SDI_27a	Software Development Project	Pr			0/2				pr. LN with mdlP 30 min (see A 2.3)	yes	
SDI_27b	Seminar for Software Development Project	S			2/2						
SDI_28	**Subject-specific compulsory Elective Module**	**SU/Ü/Pr**	**4**			**4**				**yes**	1
SDI_28a	Subject-specific compulsory Elective Module a	SU/Ü/Pr	2			2			LN[1]	yes	2/4
SDI_28b	Subject-specific compulsory Elective Module b	SU/Ü/Pr	2			2			LN[1]	yes	2/4
SDI_29	**Practical Training Semester**	**Practice-semester**	**24**				**70 ECTS**		**A 2.1**	**yes**	1
SDI_30	**Practical Course**	**SU/Ü/S/Pr**	**3**	**2**					**LN, oral presentation 20 min**	**mE/oE**	1
SDI_31	**Practical Seminar**	**SU/Ü/S/Pr**	**3**	**2**					**LN, oral presentation 20 min**	**mE/oE**	1
SDI_32	**Seminar for Bachelor Thesis**	**S**	**4**			**2**			**LN[1)]**	**yes**	1
SDI_33	**Bachelor Thesis**	**BA**	**12**				**150 ECTS**		**BA**	**yes**	1
SDI_SP1	**Concentration**	**S/SU/Ü/Pr**	**20**		**7**	**7**	**90 ECTS**		**A 2.2**	**yes**	1

Module no.	Module name (partial modules, if applicable)	Type of course	ECTS	SWS[2] Semester			Admission to the Module	Admission to the examination	Type, duration of the examination, partial performance if applicable	Grading	ECTS Weighting
				5	6	7					
	Total SWS (5.-7. Sem.)		34	4	17	13					
	Total ECTS (5.-7. Sem.)		78 12 BA	30	30	18 12 BA					

Special regulations on module examinations:

A 2.1 For the module SDI_29 a certificate of achievement (with success / without success) is awarded on a practical report of 15-25 pages.

A 2.2 The main areas of study are defined in the separate statutes on the main areas of study for engineering degree programmes at the Aschaffenburg University of Applied Sciences, the current version of which is a binding part of these statutes. Students must choose a specialisation of 14 SWS and 20 ECTS credits.

A 2.3 The graded course-related performance record for module SDI_27 is a practical performance record. The course is project-based, with a software project being worked on during the semester. The grading includes in detail:

(1) Creating a software module
(2) with project documentation (5-10 pages) and
(3) oral examination (30 min)

The projects are usually carried out in groups of four to six students each. The project result (1) is to be produced per group, the project documentation (2) and the oral examination (3) per person. The group allocation takes place at the first event and is subsequently announced by notice board or electronically on the online course platform Moodle of the TH Aschaffenburg.

_____

[1] Possible variants for the performance record:
- Written exam, 90 min
- Oral exam, 20 min
- Oral presentation, 20 min

The Faculty Council shall determine the details in the curriculum. If the grade results from several partial examinations or final grades, the grade is calculated from the arithmetic mean of all partial grades.

[2] For organisational reasons, modules can be exchanged within an academic year between the winter semester and the summer semester.

Appendix 2 to the Academic and Examination Regulations for the **Bachelor's Degree Programme Software Design International** at Aschaffenburg University of Applied Sciences

Overview of the examination contents of the modules

A1. 1st-4th semester of study

Module no.	Module name (sub-modules, if applicable)	Exam contents
SDI_01	**Mathematics I**	
SDI_01a	Mathematics I	Discrete structures, logic and algebra: • Propositional logic • Predicate logic • Boolean algebra
SDI_01b	Practice for Mathematics I	• Sets, relations, functions • Vector spaces, matrices, systems of equations • Graph theory • Number theory
SDI_02	**Mathematics II**	
SDI_02a	Mathematics II	Analysis and Numerics: • Convergence, continuity, differentiability, integrability • Differential and integral calculus • Solution of non-linear equations • Differential equations • Numerical algorithms
SDI_02b	Practice for Mathematics II	Probability theory and statistics: • Probability • Conditional probability • Probability distributions • Stochastic models • Parameter estimates • Hypothesis test
SDI_03	**Foundations of Programming Technologies**	
SDI_03a	Foundations of Programming Technologies	• Basic concepts of programming languages • Concepts of object orientation using the example of a programming language • Implementation of syntactically and semantically correct programs according to a given algorithm in the programming language learned. • Implementing a programme in a given programming language
SDI_03b	Practice for Foundations of Programming Technologies	
SDI_04	**Object-oriented Concepts**	
SDI_04a	Object-oriented Concepts	• Programming paradigms • Suitability of different programming paradigms and programming languages for different application tasks • Advanced object-oriented concepts • Syntactically and semantically correct object-oriented programmes • Implementing a programme in a given programming language
SDI_04b	Practice for Object-oriented Concepts	

Module no.	Module name (sub-modules, if applicable)	Exam contents
SDI_05	**Data Structures and Algorithms**	
SDI_05a	Data Structures and Algorithms	• The concepts algorithms, • O-notation, complexity • Basic data structures and abstract data types • Sorting algorithms • Search algorithms • Graph algorithms
SDI_05b	Practice for Data Structures and Algorithms	
SDI_06	**Project Management**	
SDI_06a	Project Management	• Definition and delimitation of project management • Project vision, goals, user-centred requirements analysis • Process models • Methods and tools of project planning and control • Project completion and documentation
SDI_06b	Project for Project Management	• Risk and stakeholder management, effort estimation • Soft skills in project management • Creativity methods • Retrospective and lessons learned • Agile and classic project management
SDI_07	**Foundations of IT Hardware**	
SDI_07a	Foundations of IT Hardware	• Components, functioning and structure of computer systems • Structure of microprocessors and memory • Basic building blocks of digital technology • Design of hardware components by means of hardware description languages
SDI_07b	Practice for Foundations of IT Hardware	• Memory organisation and hierarchy in the computer • Relationship between software development and execution of the software on the hardware • Optimisation strategies for hardware: caching, pipelining, parallelisation
SDI_08	**Multimedia Technology**	
SDI_08a	Multimedia Technology	• Basic concepts and characteristics of multimedia technologies • Web application architectures and technologies
SDI_08b	Practice for Multimedia Technology	• Methods, concepts, languages and tools of user-centred front-end development • Web application security
SDI_09	**Theoretical Computer Science**	
SDI_09a	Theoretical Computer Science	• Formal languages • Automata theory • Regular languages
SDI_09b	Practice for Theoretical Computer Science	• Grammars • Predictability • Complexity theory
SDI_10	**Foundations of Software Engineering**	
SDI_10a	Foundations of Software Engineering	• Process models in software development

Module no.	Module name (sub-modules, if applicable)	Exam contents
SDI_10b	Project for Foundations of Software Engineering	• Methods, languages and tools in the disciplines of software engineering: requirements analysis, architecture and design, implementation, test • Software management: quality management, software project management, configuration and build management, metrics • SW maintenance, reuse, reengineering
SDI_11	**Databases**	
SDI_11a	Databases	• Basic concepts of relational databases • Relational query languages, especially SQL • SQL • Database modelling • Database management systems
SDI_11b	Practice for Databases	• Normalised relational database schemas • NoSQL • Multi-user operation, transaction management, scheduling • Assignment of rights in SQL, access control
SDI_12	**Requirements Engineering and Usability**	
SDI_12a	Requirements Engineering and Usability	• Basics of requirements engineering • Methods of requirements elicitation and requirements documentation • Review and coordination of requirements in software projects, • Methods and tools for managing requirements (requirements management)
SDI_12b	Practice for Requirements Engineering and Usability	• Definition and meaning of usability, user experience (UX) and accessibility • Usability tests
SDI_13	**Collaboration, Quality and Test**	
SDI_13a	Collaboration, Quality and Test	• Collaboration • Basics of testing: test objectives, principles, core terms from the field of testing and quality assurance • Test process • Testing in the software development cycle
SDI_13b	Practice for Collaboration, Quality and Test	• Test levels, test types, maintenance test • Static test • Unit Testing • Test procedure (black box, white box, experience-based) • Tool support for the testing process
SDI_14	**Operating Systems and Networks**	
SDI_14a	Operating Systems and Networks	• Basic concepts of computer architecture and operating systems • Processes and threads • Resource management (CPU(s), memory, file system, ext. HW) • User interfaces, • Use of command lines/shells

SDI_14b	Practice for Operating Systems and Networks	• Structure of computer networks
		  - Network components
		  - Performance criteria (such as bandwidth, latency, fault tolerance)
		• Ethernet, Wireless LAN according to IEE 802.11
		• Selected network protocols (e.g., IP, TCP, UDP, http, https, DNS, DHCP)
		• Communication security: Firewalls, Virtual Private Networks

Module no.	Module name (sub-modules, if applicable)	Exam contents
SDI_15	**Foundations of Data Science**	
SDI_15a	Foundations of Data Science	• Introduction Python • Exploratory data analysis: data wrangling, data visualisation • Overview: supervised, unsupervised and reinforcement learning; classification, regression
SDI_15b	Practice for Foundations of Data Science	• Machine learning methods: linear regression, decision trees, nearest neighbours, neural networks • Evaluation metrics
SDI_16	**Agile Development Methodologies**	
SDI_16a	Agile Development Methodologies	• Agile development models • Methods and tools of agile project planning, control and implementation • Agile Software Engineering • Roles in SCRUM, the Scrum Flow and artefacts
SDI_16b	Project for Agile Development Methodologies	• Communication and interaction in agile models • Learning in agile models
SDI_17	**Human Computer Interaction**	
SDI_17a	Human Computer Interaction	• History and beginnings of human-machine interaction • Basic patterns of human interaction with machines • Sources of error and risk factors of the human-machine interface • Behavioural modelling of user interfaces via state machines • Patterns and anti-patterns in interface design • User interaction, user experience, hedonic qualities of human-machine interaction
SDI_17b	Practice for Human Computer Interaction	• Design and design basics, skeuomorphism, flat design, organic design • Ergonomic design of human-machine interfaces, accessibility • Accessibility of human-machine interfaces depending on cultural imprint, previous experiences, age
SDI_18	**IT Security**	
SDI_18a	IT Security	• Basic concepts and methods of IT security • Secure Software Development Lifecycle (SDLC) • Application security
SDI_18b	Practice for IT Security	
SDI_19	**Software Architecture and Design Patterns**	
SDI_19a	Software Architecture and Design Patterns	• Software modelling • Modelling of software by means of e.g., UML • Design pattern • Design Pattern
SDI_19b	Practice for Software Architecture and Design Pat-terns	• Software design • Software Architecture
SDI_20	**Parallel and Distributed Systems**	
SDI_20a	Parallel and Distributed Systems	• Semaphores and mutexes • Sockets • Remote Procedure Calls • Inter-Process Communication

Module no.	Module name (sub-modules, if applicable)	Exam contents
SDI_20b	Practice for Parallel and Distributed Systems	• Threads • Processes • Process management • Hardware parallelism • Multiprocessor systems
SDI_21	**German as foreign language A2**	
SDI_21a	German as foreign language A2.1	A2.1 level competences in grammar, vocabulary, phonetics, listening and reading comprehension, speaking and writing.
SDI_21b	German as foreign language A2.2	Students have A2.2 level competences in grammar, vocabulary, phonetics, listening and reading comprehension, speaking and writing.
SDI_21c	Introduction to the German labour market	
SDI_22	**German as a foreign language B1**	Students have B1.1 level competences in grammar, vocabulary, phonetics, listening and reading comprehension, speaking and writing.
SDI_23	**Business Administration**	• Entrepreneurial goals (overview) • Entrepreneurial decisions (overview) • Operational functions, the value chain (overview) • Selected thematic specialisations with reference to the degree programme

A2. Fifth to seventh semester of study

Module no.	Module designation (sub-modules, if applicable)	Exam contents
SDI_25	**Mobile Applications and Development**	
SDI_25a	Mobile Applications and Development	• Basics and examples for the design and development of mobile applications • Characteristics and peculiarities of iOS and Android as central mobile target platforms • Implementation of mobile applications
SDI_25b	Practice for Mobile Applications and Development	
SDI_26	**Web Technologies**	
SDI_26a	Web Technologies	• Technical basics • Evaluation of web frameworks • Theory and practical use of web technologies
SDI_26b	Practice for Web Technologies	
SDI_27	**Software Development Project**	
SDI_27a	Software Development Project	• Project management • Software Engineering • Retrospective and lessons learned • Development tools and environments • Implementation of a software development project
SDI_27b	Seminar for Software Development Project	
SDI_28	**Subject-specific compulsory Elective Module**	See description or catalogue of the optional (compulsory) offers.
SDI_28a	Subject-specific compulsory Elective Module a	
SDI_28b	Subject-specific compulsory Elective Module b	

Module no.	Module designation (sub-modules, if applicable)	Exam contents
SDI_29	**Practical Training Semester**	The students should get to know the operational working world as well as typical engineering activities and gain an insight into technical, organisational and business contexts. At the same time, social skills are further developed, project management skills are expanded and self-reflection and personality development are promoted. The practical semester serves the students' professional orientation. An internship report (15 - 20 pages) has to be written and a presentation on the internship has to be given (practical seminar).
SDI_30	**Practical Course**	• Professional research, evaluation and synthesis of scientific findings and transfer of the knowledge gained in practice • Presentation skills
SDI_31	**Practical Seminar**	• Professional research, evaluation and synthesis of scientific findings and transfer of the knowledge gained in practice • Presentation skills
SDI_32	**Seminar for Bachelor Thesis**	Presentation of the contents and results of the Bachelor thesis as a paper/presentation with subsequent discussion
SDI_33	**Bachelor Thesis**	• Technical competence: Application and deepening of the technical knowledge taught in the Software Design degree programme. • Researching, analysing and reflecting on relevant literature • Methodological competence: selection and application of appropriate scientific methods • Analytical competence: analysis and structuring of complex issues • Critical competence: questioning and evaluating scientific results • Communicative competence: Clear and comprehensible writing and presentation of results • Independence: Independent planning, implementation and documentation of a scientific project
SDI_SP1	**Specialisation**	see Statutes on the Specialisations for Engineering Science Programmes at the Aschaffenburg University of Applied Sciences

Abbreviations

BA	Bachelor thesis
LN	Performance Record
S	Seminar
SU	Seminar teaching
Min.	Minutes
Prakt.	practical
Ü	Practice
Pr	Project / Praktikum
mE / oE	Successful / without success
SWS	Teaching hours per week
TN	Participation certificate
Pr. LN	Practical Performance record
schrP	Examination in writing
MdlP, mündlP	Oral examination

SPO	Academic and examination regulations
AWPF	General science compulsory elective module
FWPF	Subject-specific compulsory elective module