

FSB (Subject-Specific Provisions) for the Master of Science Degree Programme Artificial Intelligence & Extended Reality (120 ECTS credits)

at Julius-Maximilians-Universität Würzburg

of 16 September 2020

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In the version of the amendment regulations dated 15 February 2023

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While we have made every effort to ensure that all the information provided in this document is accurate and up to date, we do not warrant its accuracy, correctness or completeness. The English text in this document is intended solely as a convenience to non-German-reading students and staff members. Any discrepancies or differences that may arise in the translation of the official German version shall not be legally binding. In the event of a conflict between the information provided here and the information provided in the official publications of the University of Würzburg, the official publications shall prevail.

Article 13 Subarticle 1 Sentence 2 in conjunction with Article 58 Subarticle 1 and Article 61 Subarticle 2 Sentence 1 Bayerisches Hochschulgesetz (Bavarian Higher Education Act, BayHSchG) dated 23 May 2006 (Bayerisches Gesetz- und Verordnungsblatt (Bavarian Law and Ordinance Gazette, GVBl, p. 245, Bayerische Rechtssammlung (Collection of Bavarian Laws, BayRS) 2210-1-1-WFK) as amended from time to time forms the framework for the following subject-specific provisions decreed by Julius-Maximilians-Universität Würzburg.

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Part 1: General Provisions

§ 1 Scope

These subject-specific provisions (FSB) shall supplement the ASPO (General Academic and Examination Regulations) for the Bachelor's and Master's Degree Programmes Offered by Julius-Maximilians-Universität Würzburg (JMU) dated 1 July 2015 as amended from time to time.

§ 2 Aims of the Degree Programme

¹The Artificial Intelligence & Extended Reality is offered by the Faculty of Mathematics and Computer Science at JMU as a research-based course leading to the degree of Master of Science (MSc). ²The programme is conducted entirely in English. ³The MSc in Artificial Intelligence & Extended Reality teaches students advanced skills and competences for the analysis, development and evaluation of artificial intelligence (AI) systems. ⁴A special focus of students' training is hybrid intelligence systems at the interface between artificial and human intelligence. ⁵State-of-the-art methods in the area of X reality (virtual, mixed and augmented reality) broaden the spectrum of AI methods, allow the testing of alternative AI approaches and leverage synergies between humans and computers as an area of application for collaborative and user-friendly AI.

§ 3 Start, Structure and Standard Length of Programme

(1) By way of derogation from Section 7 ASPO, the MSc in Artificial Intelligence & Extended Reality offers winter intake only.

(2) ¹The programme is structured as follows:

<i>Area or sub-area</i>	<i>ECTS credits</i>	
Mandatory courses	35	
Mandatory electives	55	
AI&XR Seminars		min. 5 max. 10
Core AI Methods		min. 10 max. 35
Core XR Methods		min. 10 max. 20
AI&XR Application & Technologies		min. 10 max. 25
Computer Science		min. 0 max. 10
Area of degree finalisation	30	
<i>Total</i>	120	

²Within the framework of the mandatory electives, students must successfully complete modules with graded assessments on a scale totalling at least 45 ECTS credits; it is thereby immaterial how the graded modules are distributed across the individual sub-areas, but students must in any case earn the ECTS points prescribed in the respective sub-areas.

(3) The standard length of programme for the Artificial Intelligence & Extended Reality Master's programme shall be four semesters, in which students shall earn a total of 120 ECTS credits.

§ 4 Prerequisites for Admission to the Programme, Recommended Fundamental Knowledge and Skills

(1) ¹Admission to the Artificial Intelligence & Extended Reality Master's programme requires the following (all conditions to be met cumulatively):

- a) A Bachelor's degree (180 ECTS credits) completed at JMU or another higher education institution in Germany or abroad or an equivalent German or foreign qualification (e.g. State Examination),
- b) Proof of competences acquired in the following areas aa) to bb) on the respective minimum scale (as a rule acquired in the framework of one of the first degrees indicated under Letter a)), according to the ECTS credits scheme used at JMU for these Bachelor's programmes):
 - aa) Competences on a scale of at least 100 ECTS credits or – in the case of programmes not modularised within the meaning of the ECTS – competences on a corresponding scale in the field of mathematics or computer science fundamentals, as a rule acquired in the framework of one of the first degrees indicated under Letter a). Of those, competences on a scale of at least 35 ECTS credits in the field of mathematics, artificial intelligence or HCI, and
 - bb) Competences acquired in the framework of a thesis on a scale of at least 10 ECTS credits on a topic from the field of computer science, according to the ECTS credits scheme used at JMU for the BSc in Computer Science.

The required competences are taught, for example, in the framework of the following programmes at JMU which lead to the degree of Bachelor of Science: Computer Science, Games Engineering, Aerospace Informatics, Mathematics, Mathematical Data Science, Business Mathematics, Business Information Systems and Human-Computer Interaction (180 ECTS credits), if necessary with a corresponding area of specialisation in the mandatory electives,

c) Suitable proof of English language proficiency to at least Level B2 of the Common European Framework of Reference for Languages (CEFR), for example:

- aa) Test of English as a Foreign Language (TOEFL) with at least 72 internet-based TOEFL points, or
- bb) International English Language Test System (IELTS) with a result of 6.0 or higher, or
- cc) Cambridge First Certificate in English (FCE), or
- dd) A grade in English of at least 'Satisfactory' (befriedigend; equivalent to at least 7 out of 15 points) as part of a German higher education entrance qualification or
A foreign higher education entrance qualification with proof of English language proficiency which is at least equivalent to the above-mentioned higher education entrance qualification, or
- ee) Proof that training (in particular in the framework of the first degree indicated under Letter a)) has already been completed with English language skills on the level specified in aa) to dd),

d) Proof of aptitude for the Artificial Intelligence & Extended Reality Master's programme furnished in the framework of an aptitude assessment procedure (cf. Appendix EV).

²The aptitude assessment panel (cf. Appendix 'Aptitude Assessment Procedure') shall decide on the fulfilment of the requirements in accordance with Sentence 1 Letter a) and whether the criteria regarding the minimum subject-related competences (Sentence 1 Letter b)) and language skills (Sentence 1 Letter c)) are met. ³When deciding on the equivalence of first degrees with the above-mentioned reference qualification as well as for verifying the required minimum competences and

their scale (in particular in the case of non-modularised programmes), the principle of reverse burden of proof and the obligation to establish equivalence shall apply in accordance with Article 63 Bayerisches Hochschulgesetz (Bavarian Higher Education Act, BayHSchG), insofar as there are no significant differences with regard to the competences (learning outcomes) acquired.

(2) ¹In the event that the requirements set out in Subsection 1 Sentence 1 Letter a) and/or b) and/or c) are not met, admission to the Artificial Intelligence & Extended Reality Master's programme shall not be possible. ²In this case, applicants shall receive corresponding notification stating the reasons for the decision and instructions on the available legal remedies, unless admission to the Master's programme may be possible in accordance with Subsection 4 if the requirements indicated in Subsection 1 Sentence 1 Letter a) are not met.

(3) ¹If the requirements set out in Subsection 1 Letter a), b) and c) are met, the applicant shall be admitted to an aptitude assessment procedure (cf. Appendix 'Aptitude Assessment Procedure'). ²Applicants who complete the aptitude assessment procedure successfully shall be entitled to commence the Artificial Intelligence & Extended Reality Master's programme at JMU, as long as the requirements for this programme do not substantially change. ³Applicants who do not complete the aptitude assessment procedure successfully shall receive notification stating the reasons for the decision and instructions on the available legal remedies. ⁴Applicants may repeat the failed aptitude assessment procedure for the Artificial Intelligence & Extended Reality programme once.

(4) ¹In order to facilitate an uninterrupted transition from a first degree, in particular a Bachelor's degree, to the Master's programme, applicants who are not yet able to produce corresponding proof of the degree required in accordance with Subsection 1 Sentence 1 Letter a) at the time of application may be admitted to the Master's programme in the semester immediately following, subject to a resolutive condition as follows (to be met cumulatively at the time of application):

- a) Proof of at least 150 ECTS credits or – in the case of programmes not modularised within the meaning of the ECTS – academic achievements on a corresponding scale in the first degree required in accordance with Subsection 1 Sentence 1 Letter a),
- b) Proof of competences as indicated in Subsection 1 Sentence 1 Letter b) (proof that a corresponding topic was assigned for the thesis is sufficient here)
- c) Proof of English language skills as specified in Subsection 1 Sentence 1 Letter c), and
- d) Proof of aptitude for the Artificial Intelligence & Extended Reality Master's programme furnished in the framework of an aptitude assessment procedure (cf. Appendix EV).

²In the event that the resolutive condition takes effect, i.e. that proof of the first degree specified in Subsection 1 Sentence 1 Letter a) is not produced at the latest by the end of the re-enrolment period for the third subject semester of the Artificial Intelligence & Extended Reality programme, the applicant is to be disenrolled at the end of the second subject semester.

(5) ¹Applicants who have not obtained their higher education entrance qualification or a relevant first degree at a German-speaking institution must additionally provide proof of sufficient proficiency in the German language. ²This proof must be provided in line with the specifications of JMU's Enrolment Statutes as last amended. ³For the Artificial Intelligence & Extended Reality Master's programme, proof of basic knowledge of the German language to at least Level A2 of the Common European Framework of Reference for Languages (CEFR) must be produced at the latest by the end of the first year of study, in accordance with Section 4 Subsection 2 Sentence 4 of the Enrolment Statutes.

§ 5 Control Examination

¹In the Master's programme in Artificial Intelligence & Extended Reality, a control examination is conducted in accordance with §13 ASPO in the following form: ²At the end of the first semester, students must have achieved 5 ECTS credits from the modules 'Introduction in AI' (10-xtAI=IAI) and 'Machine Learning' (10-xtAI=ML1) and provide evidence of this to the Examination Office. ³If

this requirement is not met, the control examination is failed for the first time and can be repeated once, provided that the candidate achieves 5 ECTS credits from the modules mentioned in sentence 2 at the end of the second semester and provides proof of this to the Examination Office. ⁴If this requirement is also not met, the control examination is definitively failed, which leads to a definitive failure of the Master's programme in Artificial Intelligence & Extended Reality (120 ECTS credits). ⁵With regard to exceeding deadlines, §13 (6) ASPO applies accordingly.

§ 6 Examination Committee

¹In accordance with Section 14 Subsection 1 Sentence 3 ASPO, the examination committee for the Artificial Intelligence & Extended Reality programme shall comprise three members. ²The examination committee may decide to bring in additional members for consultation and advice, including, but not limited to, course advisors; these members shall be non-voting.

Part 2: Assessments

§ 7 Subject-Specific Assessments

(1) The following other subject-specific forms of assessment are provided for:

(2) ¹Reports: Reports are written assessments to be compiled in private study which should demonstrate that the examinee is able to report on the contents of a course or the activities undertaken within a course (in particular a placement, project or field trip) in a structured and commensurate manner. ²Depending on the context, the term "report" can also appear in the SFB (List of Modules) as a compound term, in particular as research report, placement report, project report or field trip report.

(3) Presentations: In a presentation, examinees should demonstrate that they are capable of working scientifically on a topic assigned to them and of presenting the contents orally and, if applicable, also in written form and/or using a form of media (e.g. animation, video, poster, hand-out).

(4) Discussion: In a discussion, examinees should demonstrate that they are capable of exploring the scientific topic assigned to them in a dialogue between two or more persons and of presenting sound arguments to substantiate their position.

(5) Presentation of project results: The results of the project worked on within the respective module are to be presented orally.

§ 8 Area of Degree Finalisation: Master's Thesis and Master's Defence

(1) ¹The Master's thesis shall be worth 25 ECTS credits. ²The time allowed for completion of the thesis shall be six months. ³Topics shall only be assigned to examinees once they have earned at least 75 ECTS credits in the Artificial Intelligence & Extended Reality programme.

(2) The Master's thesis shall be defended in accordance with the provisions of the SFB.

§ 9 Gesamtnote, Studienfachnote und Bereichsnote

¹A student's overall grade shall be calculated in accordance with the provisions of Section 35 Subsection 1 ASPO. ²The grade for the degree subject (Artificial Intelligence & Extended Reality) shall be calculated in accordance with Section 35 Subsection 2 ASPO, the grades for the individual areas shall be calculated in accordance with Section 35 Subsection 3 to 5 ASPO.

³When calculating the grades for the mandatory electives, the "basket model" described in Section 35 Subsection 5 Sentences 7 to 9 ASPO shall apply. ⁴The grade for the mandatory electives shall thereby be calculated from the best modules with graded assessments on a

scale of 45 ECTS credits. ⁵When calculating the grade for the degree subject and the overall grade, the individual areas shall be assigned the following weight values:

Area or sub-area	ECTS-Punkte	Weight value for	
		Grade in degree subject	Overall grade
Mandatory courses	35	35/130	120/120
Mandatory electives	55	55/130	
AI&XR Seminars			
Core AI Methods			
Core XR Methods			
AI&XR Application & Technologies			
Computer Science			
Area of degree finalisation	30	40/130	
Total	120		

Part 3: Final Provisions

§ 10 Enforcement

¹These FSB shall enter into force on the day following their announcement. ²They shall apply to all students enrolled in the Artificial Intelligence & Extended Reality programme that leads to the award of the degree of Master of Science (120 ECTS credits) who commence studies in that programme at JMU and whose programmes are governed by the ASPO (General Academic and Examination Regulations) for the Bachelor's and Master's Degree Programmes Offered by Julius-Maximilians-Universität Würzburg dated 1 July 2015 as amended from time to time.

Appendix EV: Aptitude Assessment Procedure

¹Admission to the Master's programme shall be conditional on passing an aptitude assessment procedure. ²This shall be conducted as described below.

§ 1 Purpose of the Aptitude Assessment Procedure

The purpose of the aptitude assessment procedure shall be to gauge, on the basis of

1. educational background, in particular the achievements from the first degree, and
2. the subject-related and methodical skills in the areas indicated in Section 4 Subsection 1 Sentence 1 Letter b) FSB

who is qualified for the Master's degree programme. ²The aim shall be to determine whether the applicant satisfies the high requirements of the Artificial Intelligence & Extended Reality and will be capable of conducting scientific work independently, in particular with regard to complex research and development projects. ³Qualifying for the Artificial Intelligence & Extended Reality Master's programme presupposes proof of the applicant's aptitude according to the following rules.

§ 2 Aptitude Assessment Procedure

(1) ¹The aptitude assessment procedure is conducted by the aptitude assessment panel of the Artificial Intelligence & Extended Reality programme at the Institute of Computer Science of the Faculty of Mathematics and Computer Science of JMU.

(2) ¹Applications for admission to the Master's programme in Artificial Intelligence & Extended Reality for the following winter semester must be submitted in the form specified by the Aptitude Assessment Committee (cf. § 3) for the Master's programme in Artificial Intelligence & Extended Reality to the chair of this committee by 15 March in due form and time (cut-off date); In particular, an electronic application procedure via the relevant JMU websites may be provided for this purpose. ²Documents in accordance with paragraph 3 no. 1 letter a) may be submitted by 31 August at the latest (for the following winter semester) for reasons beyond the applicant's control (cut-off date) in order to obtain final admission to the Master's programme in Artificial Intelligence & Extended Reality. ³If this deadline cannot be met (e.g. because the final certificate for the Bachelor's programme has not yet been issued), the only option is to apply for conditional admission in accordance with the provisions of § 4 (4) FSB.

(3) Applications shall include:

1. Proof of academic achievements from the first degree as specified in Section 4 Subsection 1 Sentence 1 Letter a) FSB:
 - a) Proof of a university degree or an equivalent qualification (in the case of applications for final admission to the Master's programme), indicating the final grade achieved, or
 - b) Proof of 150 ECTS credits or – in the case of programmes not modularised within the meaning of the ECTS – academic achievements on a corresponding scale (in the case of applications for admission to the Master's programme subject to a resolutive condition) from which the grades achieved are clear.
2. A transcript of records (overview of study and examination achievements) detailing the modules passed in the areas indicated in Section 4 Subsection 1 Sentence 1 Letter b) FSB and the examination achievements attributed to them, including the ECTS credits and grades awarded or – in the case of programmes not modularised within the meaning of the ECTS – academic achievements on a corresponding scale and, if applicable, accredited examination achievements or, in the case of applications for admission to the Master's programme subject to a resolutive condition, a provisional overview of study and examination achievements with the details referred to above. It must above all be clear

from the transcript that the applicant has acquired the competences required for the Artificial Intelligence & Extended Reality programme in accordance with Section 4 Subsection 1 Sentence 1 Letter b) FSB (in the case of an application for final admission to Master's programme) or Section 4 Subsection 4 Sentence 1 Letter b) FSB in the case of an application for admission to the Master's programme subject to a resolutive condition, and

3. Proof that the applicant possesses English language skills in accordance with Section 4 Subsection 1 Sentence 1 Letter c) FSB.

§ 3 Aptitude Assessment Committee

¹The aptitude assessment procedure shall be conducted by an aptitude assessment panel comprising three members. ²The chairperson of the examination committee for the Artificial Intelligence & Extended Reality programme is a member of the aptitude assessment panel and also presides over it. ³The Faculty Board of the Faculty of Mathematics and Computer Science appoints the remaining members of the aptitude assessment panel for a period of three years; re-appointment is permitted. ⁴Only such persons may be appointed as members of the aptitude assessment panel who are entitled to act as higher education examiners (Article 85, Bayerisches Hochschulinnovationsgesetz (Bavarian Higher Education Innovation Act, BayHIG), in conjunction with the Higher Education Examiners Ordinance as last amended). ⁵The members of the aptitude assessment panel elect a deputy chairperson from among their ranks by way of simple majority. ⁶The aptitude assessment panel is quorate if its members have been summoned with due notice of three days and the majority of the members are present. ⁷In the case of elections and other decisions (especially within the aptitude assessment procedure), the panel decides by simple majority vote. ⁸In the event of a tie, the chairperson has the casting vote. ⁹In the performance of its duties, the panel may call on other persons entitled to act as higher education examiners.

§ 4 Admission to the Aptitude Assessment Procedure, Extent and Content of the Aptitude Assessment Procedure, Establishment and Announcement of the Result, Transcript

(1) Participation in the aptitude assessment procedure presupposes, in addition to the fulfilment of the requirements in accordance with Section 4 FSB, that the documents indicated in Section 2 Subsection 3 have been submitted in full and by the due date.

(2) The aptitude assessment procedure is conducted in two stages:

1. First, a pre-selection process takes place (first stage of the aptitude assessment) in which the submitted documents are examined to determine whether the applicant's particular qualifications justify admission to the Master's programme without a qualification examination. The following are considered particularly qualified:

- a) those who can produce proof of having achieved a grade of 2.0 or higher in a relevant first degree (in accordance with Section 4 Subsection 1 Sentence 1 Letter a) FSB), or

- b) ¹Produce proof of an average grade of 2.0 or higher in respect of the competences indicated in Section 4 Subsection 1 Sentence 1 Letter b) FSB. ²This average grade is calculated as follows: Firstly, all successfully completed and graded modules in the areas indicated in Section 4 Subsection 1 Sentence 1 Letter b) shall be ranked in tiers, starting with the best and beginning with the highest number of ECTS credits within the same tier; secondly, in the resulting sequence, modules shall be selected until the total sum of their ECTS credits reaches 100; finally, the average grade is calculated from the average weighted on the basis of ECTS credits (weighted arithmetic mean) of the grades for the individual modules used, whereby the last module included in the calculation is only weighted with the ECTS credits required to reach 100. ³The grade is calculated to one digit after the decimal point; all other digits are deleted without rounding. ⁴Should the applicant have passed modules on a scale of

at least 100 ECTS credits but the proportion of modules with numerical grades be less than 100 ECTS credits, only the modules with numerical grades shall be considered.

2. The second alternative can be used to determine the aptitude for the programme of applicants whose aptitude in accordance with Subsection 2 No. 1 has not yet been established if:

- a) On the basis of the documents submitted the applicant is qualified as follows:
 - aa) Through a relevant first degree (in accordance with Section 4 Subsection 1 Sentence 1 Letter a) FSB) with a grade of at least 2.5 or higher
 - or
 - bb) Through an average grade of 2.5 or higher in the areas indicated in Section 4 Subsection 1 Sentence 1 Letter b) FSB. ²This average grade is calculated as follows: Firstly, all successfully completed and graded modules in the areas indicated in Section 4 Subsection 1 Sentence 1 Letter b) shall be ranked in tiers, starting with the best and beginning with the highest number of ECTS credits within the same tier; secondly, in the resulting sequence, modules shall be selected until the total sum of their ECTS credits reaches 80; finally, the average grade is calculated from the average weighted on the basis of ECTS credits (weighted arithmetic mean) of the grades for the individual modules used, whereby the last module included in the calculation is only weighted with the ECTS credits required to reach 80. ³The grade is calculated to one digit after the decimal point; all other digits are deleted without rounding. ⁴Should the applicant have passed modules on a scale of at least 80 ECTS credits but the proportion of modules with numerical grades be less than 80 ECTS credits, only the modules with numerical grades shall be considered,

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- b) by passing an additional examination designed to provide further information about the applicant's suitability for the Master's programme in Artificial Intelligence & Extended Reality (second stage of the aptitude assessment). The additional examination takes the form of a written examination (approx. 30-60 minutes) graded in accordance with § 31 (1) and (2) ASPO or an individual oral examination (20-30 minutes). The examination assesses the applicant's knowledge of the following areas of artificial intelligence and extended reality, which are also listed in Section 4 (1) sentence 1 letter b) FSB: Theoretical computer science, practical computer science (algorithms and data structures, programming skills, software engineering) and technical computer science (computing systems and information transmission). The individual oral examination is conducted and assessed by a person appointed by the aptitude committee; an assessor is also appointed by the aptitude committee. The examiner may be a member of the aptitude committee itself or a university lecturer who teaches courses in the Master's programme in Artificial Intelligence & Extended Reality and is authorised to conduct university examinations in accordance with Art. 85 BayHIG (Bavarian Higher Education Act) and the University Examination Regulations. The examiner awards a grade in accordance with the grading scale specified in § 31 (1) and (2) ASPO (1.0; 1.3; 1.7; ...; 3.7; 4.0; 5.0). A transcript must be made of the oral individual examination, which must include the date and place of the examination, the names of the examiner and the assessor, the name of the candidate, the main content of the discussion, the examiner's assessment and the overall result. The transcript must be signed by the examiner and the assessor. The examination is passed if the grade is 4.0 or better.

(3) ¹Applicants shall be notified in writing of the result of the aptitude assessment procedure and, if aptitude has been established, applicants shall present the respective notification at the time of

enrolment. ²Rejections shall be justified and include information on available legal remedies. ³Applicants may repeat the aptitude assessment procedure for the Artificial Intelligence & Extended Reality programme once (§4 Paragraph 3 Sentence 4 FSB).

Appendix SFB: Studienfachbeschreibung (List of Modules)

Appendix SFB: Studienfachbeschreibung (List of Modules) for the subject Artificial Intelligence & Extended Reality leading to the degree "Master of Science" (120 ECTS credits)

(Responsible: Institute of Computer Science)

Legend: **A** = thesis, **B/NB** = successfully / not successfully completed, **E** = field trip, **K** = colloquium, **LV** = course(s), **NUM** = numerical grade, **O** = conversatorium, **P** = practical course / lab, **PL** = assessment(s), **R** = project, **S** = seminar, **SS** = summer semester, **SWS** = weekly contact hours, **T** = tutorial, **TN** = participants, **Ü** = exercise, **VL** = prerequisites, **V** = lecture, **WS** = winter semester

Remarks:

Unless otherwise stated, **courses and assessments** are held in German.

Should there be the **option to choose between several methods of assessment**, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and communicate this in the customary manner.

Should a module comprise **more than one graded assessment**, all assessments are equally weighted, unless otherwise stated below.

Should the assessment comprise **several individual assessments**, successful completion of the module requires successful completion of all individual assessments.

Unless otherwise stated, **assessments** for the modules in these SFB are offered every semester.

Abbreviation	Version	Module and submodules (German/English)	(SWS) Type of LV	ECTS credits	Dauer (Sem)	TN and selection	Method of grading	Method and extent of assessment	Assessment language	Previously passed modules	1) Creditable for bonus, 2) LV language, 3) Assessment frequency, 4) other requirements, 5) further information on duration, 6) possible specialisations, 7) other
Mandatory courses (35 ECTS credits)											
10-xtAI=L1	2024-WS	AI&XR Lab 1 AI&XR Lab 1	R(3)	5	1		NUM	Project work: Report (approx. 20 p.) with presentation (30-45 min.) followed by a discussion on the topic	English		1) Creditable for bonus 2) English
10-xtAI=L2	2024-WS	AI&XR Lab 2 AI&XR Lab 2	R(6)	10	1		NUM	Project work: Report (approx. 20 p.) with presentation (30-45 min.) followed by a discussion on the topic	English		1) Creditable for bonus 2) English
10-xtAI=L3	2024-WS	AI&XR Lab 3 AI&XR Lab 3	R(6)	10	1		NUM	Project work: Report (approx. 20 p.) with presentation (30-45 min.) followed by a discussion on the topic	English		1) Creditable for bonus 2) English

10-xtAI=IAI	2020-WS	Introduction in AI Introduction in AI	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=ML1	2024-WS	Machine Learning Machine Learning	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
Mandatory electives (55 ECTS credits)											
AI&XR Seminars (min. 5 to max. 10 ECTS credits)											
10-xtAI=SEM1	2024-WS	Seminar 1 - Artificial Intelligence & Extended Reality Seminar 1 - Artificial Intelligence & Extended Reality	S(2)	5	1		NUM	Term paper (10-15 p.) and presentation (30-45 min.) followed by a discussion of the seminar topic	English		1) Creditable for bonus 2) English
10-xtAI=SEM2	2024-WS	Seminar 2 - Artificial Intelligence & Extended Reality Seminar 2 - Artificial Intelligence & Extended Reality	S(2)	5	1		NUM	Term paper (10-15 p.) and presentation (30-45 min.) followed by a discussion of the seminar topic	English		1) Creditable for bonus 2) English
Core AI Methods (min. 10 to max. 35 ECTS credits)											
10-xtAI=DS1	2020-WS	Data Science 1 Data Science 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=DS2	2020-WS	Data Science 2 Data Science 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=ML2	2024-WS	Advanced Machine Learning Advanced Machine Learning	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=NLP1	2020-WS	Natural Language Processing 1 Natural Language Processing 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English

10-xtAI=NLP2	2020-WS	Natural Language Processing 2 Natural Language Processing 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=TAI1	2020-WS	Theorie der Künstlichen Intelligenz 1 Theory of Artificial Intelligence 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=TAI2	2020-WS	Theorie der Künstlichen Intelligenz 2 Theory of Artificial Intelligence 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-AI=CV1	2024-WS	Computer Vision 1 Computer Vision 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-AI=CV2	2024-WS	Computer Vision 2 Computer Vision 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-I=MLN1	2023-WS	Machine Learning for Networks 1 Machine Learning for Networks 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-I=MLN2	2023-WS	Machine Learning for Networks 2 Machine Learning for Networks 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-I=IP	2022-WS	Image Processing and Computational Photography Image Processing and Computational Photography	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English

10-I=RLCDM	2022-WS	Reinforcement Learning and Computational Decision-Making Reinforcement Learning and Computational Decision-Making	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-I=MNLP	2022-WS	Multilingual NLP Multilingual NLP	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-xtAI=AIM1	2020-WS	Selected Topics in AI Methods 1 Selected Topics in AI Methods 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=AIM2	2020-WS	Selected Topics in AI Methods 2 Selected Topics in AI Methods 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
Core XR Methods (min. 10 to max. 20 ECTS credits)											
10-HCI-PRIS	2021-WS	Principles of Interactive Systems Principles of Interactive Systems	V(2) + Ü(2)	5	1		NUM	a) Written exam (approx. 90 min.) or b) Individual oral examination (approx. 30min.)	German and/or English		1) Creditable for bonus 2) German and/or English
10-HCI-MMI	2021-WS	Multimodal Interfaces Multimodal Interfaces	V(2) + Ü(2)	5	1		NUM	a) Written exam (approx. 90 min.) or b) Presentation of the project results (approx. 30 min.) or c) Individual oral examination (approx. 30min.)	German and/or English		1) Creditable for bonus 2) German and/or English
10-HCI-3DUI	2021-WS	3D User Interfaces 3D User Interfaces	V(2) + Ü(2)	5	1		NUM	a) Presentation of the project results (approx. 30 min.) or b) Individual oral examination (approx. 30min.)	German and/or English		1) Creditable for bonus 2) German and/or English
10-xtAI=XRM	2020-WS	Selected Topics in XR Methods	V(2) + Ü(2)	5	1		NUM	a) Written exam (approx. 60-90 min.) or	English		1) Creditable for bonus 2) English

		Selected Topics in XR Methods						b) Project work: Report (approx. 20 p.) with presentation (30-45 min.) followed by a discussion on the topic oder c) Individual oral examination (approx. 20 min.) or d) Group oral examination (max. 3 TN, each approx. 15 min.)			
AI Application & Technologies (min. 10 to max. 25 ECTS credits)											
10-LURI=3D	2020-WS	3D Point Cloud Processing 3D Point Cloud Processing	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-LURI=PHOTO	2023-WS	Photogrammetric Machine Vision Photogrammetric Machine Vision	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-LURI=AMS	2023-WS	Autonome Mobile Systeme Autonomous Mobile Systems	V(4) + Ü(2)	10	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-LURI=RO1	2023-WS	Robotik 1 Robotics 1	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-LURI=RO2	2023-WS	Robotik 2 Robotics 2	V(4) + Ü(2) + P(1)	10	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
10-I=DB2	2021-WS	Datenbanken 2 Databases 2	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus

10-I=DRLOC	2022-SS	Deep Reinforcement Learning for Optimal Control Deep Reinforcement Learning for Optimal Control	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=SAC	2020-WS	Self-aware Computing Self-aware Computing	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-I=ICG	2023-WS	Interaktive Computergraphik Interactive Computer Graphics	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus
10-xtAI=WPrakt	2024-WS	Wissenschaftliches Praktikum AI&XR Scientific Internship AI&XR	P(6)	10	1		B/NB	Project report (approx. 10 p.) and presentation (30-45 min.) followed by a discussion of the topic	German and/or English		5) 8 Wochen
10-xtAI=ISS	2024-WS	International Summer School AI&XR International Summer School AI&XR	R(6)	5	1		NUM	a) Written exam (approx. 60-90 min.) or b) Project work: Report (approx. 20 p.) with presentation (30-45 min.) followed by a discussion on the topic oder c) Individual oral examination (approx. 20 min.) or d) Group oral examination (max. 3 TN, each approx. 15 min.)	English		2) English 5) Project is conducted in blocks, duration 4-6 weeks
07-MLBI	2020-WS	Maschinelles Lernen in der Bioinformatik Machine Learning in Bioinformatics	V(2)+ Ü(2)	5	1	10 (Los)	NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-xtAI=ST	2024-WS	Selected Topics in AI&XR Application & Technologies Selected Topics in AI&XR Application & Technologies	V(2) + Ü(2)	5	1		NUM	a) Written exam (approx. 60-90 min.) or b) Project work: Report (approx. 20 p.) with	English		1) Creditable for bonus 2) English

								presentation (30-45 min.) followed by a discussion on the topic oder c) Individual oral examination (approx. 20 min.) or d) Group oral examination (max. 3 TN, each approx. 15 min.)			
10-I=MIR	2022-WS	Music Information Retrieval Music Information Retrieval	V(2) + Ü(2)	5	1		NUM	a) Written exam (approx. 60-120 min.) oder b) Individual oral examination (approx. 20 min.) or c) Group oral examination (max. 3 TN, each approx. 15 min.)	German and/or English		1) Creditable for bonus 2) German and/or English
10-I=RRS	2023-WS	Remote Sensing Remote Sensing	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus 2) German and/or English
Computer Science (min 0 to max. 10 ECTS credits)											
10-I=ST	2023-WS	Simulationstechnik zur Systemanalyse Discrete Event Simulation	V(2)+ Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus
10-I=SSS	2023-WS	Sicherheit von Softwaresystemen Security of Software Systems	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	English		1) Creditable for bonus 2) English
10-I=DDB	2017-WS	Deduktive Datenbanken Deductive Databases	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus
10-I=LP	2021-WS	Logische Programmierung Logic Programming	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus
10-I=SB	2021-WS	Systems Benchmarking Systems Benchmarking	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus

10-I=APR	2021-WS	Fortgeschrittenes Programmieren Advanced Programming	V(2) + Ü(2)	5	1		NUM	Written exam (approx. 60-120 min.) ¹	German and/or English		1) Creditable for bonus
10-I=AKII	2023-WS	Ausgewählte Kapitel der Informatik Selected Topics in Computer Science	V(2) + Ü(2) or S(2)	5	1		NUM	a) Written exam (approx. 60-120 min.) oder b) Project work: Report (approx. 20 p.) with presentation (30-45 min.) followed by a discussion of the topic or c) Individual oral examination (approx. 20 min.) or d) Group oral examination (max. 3 TN, each approx. 15 min.)	German and/or English		1) Creditable for bonus
Area of degree finalisation (30 ECTS credits)											
10-xtAI=MA	2024-WS	Master's Thesis AI&XR Master's Thesis AI&XR		25	1		NUM	Master's thesis (50-100 p.)	English		5) Time for completion: 6 months
10-xtAI=MK	2024-WS	Concluding Colloquium AI&XR Concluding Colloquium AI&XR	K	5	1		B/NB	Master's defense (approx. 60 Min.)	English		

¹After prior notification by the lecturer at the beginning of the course, the written exam can be replaced by an individual oral examination (approx. 20 min.) or a group oral examination (2 participants, each approx. 15 min.).