Appendices Bachelor's degree programme Artificial Intelligence
2023 – 2024

Appendix I   Learning outcomes of the degree programme (Article 3.1.1)

The bachelor demonstrates knowledge, understanding, and the ability to evaluate, analyse and interpret relevant data in the field of

1. the symbolic approach to Artificial Intelligence and has the ability to apply this.

2. the numerical, non-symbolic approach to Artificial Intelligence and has the ability to apply this.

3. computational models of cognitive processes and has expertise in constructing and applying this.

4. autonomous systems and robotics and has the ability to apply this.

5. linguistics and language technology and has the ability to apply this.

6. knowledge and agent systems and has expertise in designing, implementing and applying these.

The bachelor has knowledge and understanding of

7. the most important philosophical theories developed in the areas of artificial intelligence and cognition.
8. relevant theories developed in the area of empirical sciences, psychology, biology and physics and has experience applying and analysing results thereof.

The bachelor has relevant knowledge and ability

9. to apply methods and techniques from mathematics and logic used in Artificial Intelligence.
10. to use algorithms, data structures and important programming languages used in Artificial Intelligence.

The bachelor has the ability

11. on an academic level, to analyse problems, critically review scientific results and communicate about this both individually as well as in a group, both oral and in written form, also in a broader societal context.
12. to critically reflect on one's own working method and to recognize the need for continued learning on a high degree of autonomy, also in the context of a master or a specialist profession.

Appendix II Majors and Minors of the degree programme (Article 3.7.4)

The degree programme has one **Major**: Artificial Intelligence

The degree programme does not offer any **Minors**.

Appendix III Course units in the propaedeutic phase
(**List of course units; Article 4.1.1**)
(**Compulsory order of examinations; Article 9.3**)

The propaedeutic phase consists of twelve mandatory course units (60 ECTS), listed in the table below. Course details including modes of instruction, and modes of assessment are described in OCASYS.

Mandatory course units

Course code	Course unit name	ECTS
WBAI018-05	Algorithms and Data Structures	5
WBAI023-05	Artificial Intelligence 1	5
WBAI002-05	Autonomous Systems	5
WBAI010-05	Basic Scientific Skills	5
WBAI048-05	Calculus for Artificial Intelligence	5
WBAI021-05	Cognitive Psychology	5
WBAI022-05	General Linguistics	5
WBAI003-05	Imperative Programming	5
WBAI004-05	Introduction to Artificial Intelligence	5
WBAI012-05	Introduction to Logic	5
WBAI026-05	Introduction to the Brain	5
WBAI050-05	Linear Algebra and Multivariable Calculus	5

There is no formal order of examinations for any of the course units in the propaedeutic phase.

Introduction to Logic (MA + Guests) [WBAI013-05] is an elective course, equivalent to Introduction to Logic [WBAI012-05], offered to students from the (Applied) Mathematics programme, and other external students.

Appendix IV   Course units in the post-propaedeutic phase
(List of course units; Article 7.1.1)
(Compulsory order of examinations; Article 9.3)

The post-propaedeutic phase consists of mandatory course units (90 ECTS), including the Bachelor's Project and three Practical course units, and elective course units (30 ECTS). Course details including entry requirements, modes of instruction, and modes of assessment are described in OCASYS.

Mandatory course units

Course code	Course unit name	ECTS
WBAI017-05	Advanced Logic	5
WBAI009-05	Architectures of Intelligence	5
WBAI901-15	Bachelor's Project	15
WBAI011-05	Data Analytics and Communication	5
WBAI040-05	Ethics in Artificial Intelligence	5
WBAI056-05	Introduction to Machine Learning (for AI)	5
WBAI057-05	Knowledge and Agent Systems	5
WBAI007-05	Language and Speech Technology	5
WBAI028-05	Neural Networks	5
WBAI045-05	Object-Oriented Programming	5
FI203AI	Philosophy of AI and Cognition	5
WBAI016-05	Signals and Systems	5
WBAI049-05	Statistics	5
	Practical course units	15

Students have to choose three Practical course units (15 ECTS) from the following list:

Practical course units

Course code	Course unit name	ECTS
WBAI046-05	Agent Technology Practical	5
WBAI025-05	Cognitive Ergonomics Practical	5
WBAI020-05	Cognitive Modelling Practical	5
WBAI014-05	Knowledge Technology Practical	5
WBAI027-05	Language Technology Practical	5
WBAI015-05	Reinforcement Learning Practical	5
WBAI029-05	Robotics Practical 1	5
WBAI030-05	Robotics Practical 2	5

Note: It is possible to take more than three practical course units, if students use their elective space for the additional courses.

In addition to the mandatory programme, the post-propaedeutic phase consists of elective course units (30 ECTS). 15 ECTS have to be chosen from a list of pre-approved electives. The other 15 ECTS can be either from the list of pre-approved electives, or free electives for which students need to request the formal approval of the Board of Examiners.

Students can choose from the following list of course units without needing approval of the Board of Examiners:

Pre-approved electives

Course code	Course unit name	ECTS
WBCS009-05	Advanced Algorithms and Data Structures	5
WBCS001-05	Advanced Object Oriented Programming	5
WBCS035-05	Advanced Programming in C++	5
WBCS033-05	C++ Fundamentals	5
PSB3E-CP02	Cognition and Attention	5
WBCS039-05	Compiler Construction	5
WBCS044-05	Computational Complexity	5
LIX025B05	Computational Grammar	5
WBCS019-05	Computer Graphics	5
WBCS002-05	Functional Programming	5
PSB3E-M06	Human Error	5
WBAI055-05	Human Factors	5
WBCS040-05	Information Retrieval	5
WBCS004-05	Information Security	5
WBCS021-05	Introduction to Information Systems	5
WBEC002-05	Introduction to Science Education [a]	5
RGARI70210	IT Law for non-law Students [a]	10
WBCS027-05	Languages and Machines	5
LIX003B05	Logic Programming	5
WBCS029-05	Parallel Computing	5
FI202LBG	Philosophy of Mind: Body, Brain, Mind [a]	7
FI153LH	Philosophy of the Natural Sciences: Physics and Metaphysics	15
WBCS012-05	Problem Analysis and Software Design	5
WBCS034-05	Programming in C++	5
WBAI052-05	Structural Analysis of Language for Cognitive Modelling	5
WBAI054-05	Uncertainty in Machine Learning	5
WBCS008-05	Web Engineering	5
	Additional practical course units from the list of practical course units above	

a) This course unit is taught in Dutch.

As stated in Article 8.2.2, students are free to take any University Minor as a broadening module without explicit permission from the Board of Examiners. An exception to this rule is the Minor *Data Wise: Data Science in Society*, organized by the Faculty of Behavioural and Social Sciences, as the contents significantly overlap with the Artificial Intelligence BSc programme. It is also not possible to include a course from a University Minor if an equivalent or similar course is already taught in the Artificial Intelligence BSc programme.

Compulsory order of examinations (Article 9.3)

The examinations for the course units listed below may not be taken before the examinations for the associated course units have been passed:

Course unit name and code	Entry requirements [a]
Advanced Logic [WBAI017-05]	Introduction to Logic [WBAI012-05 or WBAI013-05]
Bachelor's Project [WBAI901-15]	Completion of all propaedeutic course units Completion of at least 135 ECTS credit points from the AI bachelor's programme Data Analytics and Communication [WBAI011-05] Statistics [WBAI049-05]
Cognitive Ergonomics Practical [WBAI025-05]	Cognitive Psychology [WBAI021-05]
Cognitive Modelling Practical [WBAI020-05]	Architectures of Intelligence [WBAI009-05] Cognitive Psychology [WBAI021-05] Statistics [WBAI049-05]
Data Analytics and Communication [WBAI011-05]	Statistics [WBAI049-05]
Introduction to Machine Learning (for AI) [WBAI056-05]	Calculus for AI [WBAI048-05] Linear Algebra and Multivariable Calculus [WBAI050-05]
Language and Speech Technology [WBAI007-05]	Calculus for AI [WBAI048-05] General Linguistics [WBAI022-05]
Language Technology Practical [WBAI027-05]	Language and Speech Technology [WBAI007-05]
Neural Networks [WBAI028-05]	Introduction to Machine Learning [WBAI056-05]
Reinforcement Learning Practical [WBAI015-05]	Autonomous Systems [WBAI002-05] Imperative Programming [WBAI003-05]
Robotics Practical 1 [WBAI029-05]	Calculus for AI [WBAI048-05] Linear Algebra and Multivariable Calculus [WBAI050-05]
Robotics Practical 2 [WBAI030-05]	Calculus for AI [WBAI048-05] Linear Algebra and Multivariable Calculus [WBAI050-05]
Signals and Systems [WBAI016-05]	Calculus for AI [WBAI048-05] Linear Algebra and Multivariable Calculus [WBAI050-05]
Structural Analysis of Language for Cognitive Modelling [WBAI052-05]	General Linguistics [WBAI022-05]
Uncertainty in Machine Learning [WBAI054-05]	Introduction to Machine Learning [WBAI056-05] or Neural Networks [WBAI028-05]

a) In the event that a student has applied for a course to count as a course replacement, this replacement course also counts as a valid alternative for the course entry requirement in question.

Appendix V   Admission to the post-propaedeutic phase (Article 6.1.1)

The following candidates will be admitted to the post-propaedeutic phase:
Students who have been issued a positive study advice from the degree programme in question.

Appendix VI   Contact hours propaedeutic and post-propaedeutic phase
(Article 3.6)

Contact hours Propaedeutic phase	
Type of contact hour	**Contact hours per year (approx. 682)**
Lectures	Approx. 270
Tutorial	Approx. 180
Practicals	Approx. 90
Tutoring / Mentor Hours	Approx. 10
Supervision during an internship	0
Final Examinations and Re-examinations	Approx. 60
Mid-term Examinations	Approx. 15
Career Support (FSE General)	Approx. 12
Miscellaneous Sessions (e.g. Q&A)	Approx. 30

Contact hours Post-propaedeutic phase	
Type of contact hour	**Contact hours per year (approx. 1251.5)**
Lectures	Approx. 520
Tutorial	Approx. 100
Practicals	Approx. 460
Tutoring / Mentor Hours	0
Supervision during an internship or project	Approx 7.5
Final Examinations and Re-examinations	Approx. 100
Mid-term Examinations	Approx. 0
Career Support (FSE General)	Approx. 24
Miscellaneous Sessions (e.g. Q&A)	Approx. 40

Appendix VII   Additional requirements Open degree programmes
(Article 7.3)

Students are permitted to obtain a diploma in the Artificial Intelligence BSc programme without fully fitting the curriculum set out in Appendix III and Appendix IV. This can only happen in consultation with and after approval of the Board of Examiners of the degree programme. Students are required to finish a BSc Project, to guarantee they are able to function as a BSc level researcher in line with the Dublin level descriptors / Framework for Qualifications of the European Higher Education Area, and are required to fit the Learning Outcomes of the programme (set out in Appendix I). These Learning Outcomes have been established in accordance with the AI BSc Framework of Reference of the Netherlands.

Appendix VIII   Transitional provisions (Article 12.1)

To prevent negative effects of curriculum changes on students who were already registered in the programme before these changes were made, the following transitional provisions apply.
The provisions are listed in reverse-chronological order. General provisions are described through text.
Course units that are a direct replacement for discontinued course units are listed in table format.

Students who started in 2021–2022 or before:

Discontinued course unit			From 2023-2024 onwards replaced by		
Course code	Course name	ECTS	Course code	Course name	ECTS
WBAI006-05	Knowledge and Agent Technology	5	WBAI057-05	Knowledge and Agent Systems	5

Students who started in 2020–2021 or before:

Discontinued course unit			Replacement course unit		
Course code	Course name	ECTS	Course code	Course name	ECTS
WBAI047-05	Constraint-based Grammatical Analysis	5	WBAI052-05	Structural Analysis of Language for Cognitive Modelling	5
WBCS037-05	Linear Algebra and Multivariable Calculus	5	WBAI050-05	Linear Algebra and Multivariable Calculus	5
WBCS028-05	Object-Oriented Programming	5	WBAI045-05	Object-Oriented Programming	5
WBCS038-05	Statistics	5	WBAI049-05	Statistics	5

Students are allowed to take Neurophysics (Physics for Artificial Intelligence) [WBAI008-05] instead of Ethics in Artificial Intelligence [WBAI040-05] as part of their mandatory programme. If they choose to do so, Ethics in Artificial Intelligence [WBAI040-05] may be used as a pre-approved elective option instead.

Robotics Practical 3 [WBAI051-05] is considered a valid practical course unit of the Artificial Intelligence BSc programme. Students who completed this course are not allowed to follow Robotics Practical 1 [WBAI029-05].

From 23-24 onwards, Artificial Intelligence 2 [WBAI001-05] is no longer offered and no longer a compulsory course, while Introduction to Machine Learning (for AI) [WBAI056-05] turns into a compulsory course. Students who started in 20-21 or before are allowed to include Artificial

Intelligence 2 instead of Introduction to Machine Learning (for AI) as part of their mandatory programme. If they choose to do so, Introduction to Machine Learning (for AI) may be included as a pre-approved elective.

Students who started in 2019–2020 or before:

Discontinued course unit			Replacement course unit		
Course code	Course name	ECTS	Course code	Course name	ECTS
KIB.PAS05	Autonomous Systems Practical	5	WBAI029-05	Robotics Practical 1	5
WBAI14001	Autonomous Systems Practical Extension	5	WBAI030-05	Robotics Practical 2	5
FI053CW	Philosophy of Cognitive Science	5	FI203AI	Philosophy of AI and Cognition	5

Additionally, the table below shows courses that are considered equivalent, but have changed course codes since 2020-2021. While the course codes of these courses are different, they are considered equal for the intents and purposes of your BSc diploma. Note that this list only contains courses that have been part of previous Teaching and Examination Regulations, and only courses that have not changed their name. Any other equivalences that may exist between courses that can be beneficial in the event of a course replacement or a potential block in the event of a free-choice elective will have to be checked by the Board of Examiners of the own degree programme.

Course name	Old Course code	New Course code	ECTS
Organized by Artificial Intelligence (BSc)			
Advanced Logic	KIB.VL03	WBAI017-05	5
Algorithms and Data Structures (AI)	WPAI18002	WBAI018-05	5
Architectures of Intelligence	KIB.AVI03	WBAI009-05	5
Artificial Intelligence 1	KIB.KI103	WBAI023-05	5
Artificial Intelligence 2	KIB.KI203	WBAI001-05	5
Autonomous Systems	KIB.AS03	WBAI002-05	5
Bachelor's Project	KIB.PROJ03	WBAI901-10	10
Basic Scientific Skills	KIB.WBV06	WBAI010-05	5
Cognitive Ergonomics Practical	WBAI19002	WBAI025-05	5
Cognitive Modelling Practical	WBAI18002	WBAI020-05	5
Cognitive Psychology	KIB.CP06	WBAI021-05	5
Data Analytics and Communication	WBAI17001	WBAI011-05	5
General Linguistics	KIB.ATW03	WBAI022-05	5
Imperative Programming	WPAI19001	WBAI003-05	5
Introduction to Artificial Intelligence	KIB.ORKI03	WBAI004-05	5
Introduction to Logic (AI)	WPAI14001	WBAI012-05	5
Introduction to the Brain	WPAI18001	WBAI026-05	5
Knowledge and Agent Technology	KIB.KT03	WBAI006-05	5

Knowledge Technology Practical	KIB.PKT10	WBAI014-05	5
Language and Speech Technology	KIB.TST03	WBAI007-05	5
Language Technology Practical	KIB.PTT07	WBAI027-05	5
Neural Networks AI	KIB.NNKI03	WBAI028-05	5
Neurophysics (Physics for Artificial Intelligence)	KIB.NF07	WBAI008-05	5
Reinforcement Learning Practical	WBAI19001	WBAI015-05	5
Signals and Systems	KIB.SENS12	WBAI016-05	5
Organized by Other Programmes (Mandatory)			
Calculus for Artificial Intelligence	WPMA14003	WBAI048-05	5
Linear Algebra and Multivariable Calculus	WPMA14005	WBCS037-05	5
Object-Oriented Programming	INBOGP-08	WBCS028-05	5
Statistics	WISTAKI-07	WBCS038-05	5
Organized by Other Programmes (Pre-approved Elective)			
Computer Graphics	INBCG-08	WBCS019-05	5
Functional Programming	INBFP-08	WBCS002-05	5
Information Security	INBSEC-08	WBCS004-05	5
Introduction to Information Systems	INBIIS-08	WBCS021-05	5
Parallel Computing	INBPAR-08	WBCS029-05	5
Problem Analysis and Software Design	WBCS16000	WBCS012-05	5
Philosophy of Science	FIWET090	FIWET180	5
Self-organization	WBLS19046	WBBY069-05	5

Cases not listed in the Teaching and Examination Regulations, through either the current curriculum or the transitional provisions, are to be treated by the Board of Examiners of the degree programme.