Bachelor Artificial Intelligence

Appendix I Learning outcomes of the Bachelor's degree programme in Artificial Intelligence (Article 1.3)

The bachelor demonstrates knowledge, understanding, and the ability to evaluate, analyze 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- and speech 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 analyzing 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 analyze 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 Follow-on Master's degree programmes (Article 1.5)

The Bachelor's degree programme in Artificial Intelligence will grant unconditional admission to the following Master's degree programmes at the University of Groningen:

- Artificial Intelligence
- Human-Machine Communication
- Education and Communication in Mathematics and Natural Sciences (Science Communication programme) – this programme is taught in Dutch

Appendix III Majors and Minors in the degree programme (Article 2.1.2)

The degree programme has the following **Major**:
- Artificial Intelligence

Appendix IV   Course units in the propaedeutic phase

The propaedeutic phase comprises a number of course units, each with a student workload of 5 ECTS, listed in the table below (Article 3.1.1).

The table states which course units include practicals in addition to lectures, and whether the practical in question (including reporting) is part of the examination (Article 3.2).

In addition, the table also states which other modes of assessment are included in the examination (Article 7.4).

Course unit name	Type of examination WE: written exam PR: practical assessment A: (homework) assignments CA: compulsory attendance PT: presentation R: report/essay					
	WE	PR	A	CA	PT	R
Algorithms and Data Structures in C	X	X				
Artificial Intelligence I	X	X				
Autonomous Systems	X	X		X		X
Basic Scientific Skills		X		X	X	X
Calculus	X	X	X			
Cognitive Psychology	X	X	X	X	X	X
General Linguistics	X		X			
Imperative Programming	X	X				
Introduction to Artificial Intelligence	X		X			
Introduction to Computing Science	X	X			X	X
Introduction to Logic	X		X			
Linear Algebra	X		X			

Appendix V   Course units in the post-propaedeutic phase

The post-propaedeutic phase comprises the following course units with their related student workloads:
1. Course units in the **Major** (90 ECTS)
2. **Minor space** (30 ECTS)

The Major comprises the following course units (each with a student workload of 5 ECTS unless stated otherwise), with the associated examination types (Articles 6.1 6.2 and 7.4):

Course unit name	Type of examination WE: written exam PR: (practical) assignments CA: compulsory attendance PT: presentation R: report/essay				
	WE	PR	CA	PT	R
Advanced Logic	X	X			
Architectures of Intelligence	X	X			X
Artificial Intelligence II	X	X			
Biopsychology	X				
Human Factors	X				
Knowledge and Agent Technology	X	X			
Language and Speech Technology	X	X			
Neural Networks	X	X			
Neurophysics	X	X			
Object-Oriented Programming	X	X			
Philosophy of Cognitive Science	X				
Research Methods	X	X	X	X	
Statistics	X	X	X		
Bachelor's Project (10 ECTS)		X	X	X	X
Students must choose at least 15 ECTS worth of the following practicals:					
Autonomous Systems Practical (5 or 10 ECTS)		X	X		X
Cognitive Science Practical		X		X	X
Knowledge Technology Practical		X		X	X
Language Technology Practical		X			
Speech Technology Practical	X	X		X	X

The table states which course units include practicals in addition to lectures; the practicals (including reporting) are part of the examination (Article 6.2).

For course units without written examinations, participation in the relevant practical (including reporting) will be considered as having passed the examination.

The **Minor space** comprises the following course units:
- *At least* 15 ECTS in electives from the list below. Additional practicals, as listed under the Major course units but not followed as part of the Major programme, may also be followed.
- Supplemented by a freely chosen set of course units *to be approved by the Board of Examiners.*

Students can choose from the following list of course units:
(please refer to the OERs of the relevant degree programmes for modes of assessment)

- Biological Physics
- Cognition and Attention
- Cognitive Neuroscience
- Computer Graphics
- Thinking and decision making
- Functional Programming
- Informaticarecht voor niet-juristen (10 ECTS)*
- Information Security
- Introduction to Informationsystems
- Introduction Intelligent Systems
- Introduction to Biomedical Computing
- Learning: Theory and practice
- Logical Programming
- Human error
- Natural Language Processing
- Paradoxes
- Parallel Computing
- Philosophy of Language
- Philosophy of Mind 2: Consciousness and Action
- Philosophy of the Natural Sciences
- Programming in C++ (part I, II and/or part III, together max. 8 ECTS; part I max. 2 ECTS)
- Software Analysis and Design
- Software Requirements Engineering
- Zelf-organisatie van Ecologische en Sociale Systemen*

Taught in Dutch

It is also possible to take a **Deepening Minor**, offered by the University of Groningen, in the Minor space *with the approval of the Board of Examiners*. Course units offered by other institutes of academic education may qualify as substitutes for the Deepening Minor *with the approval of the Board of Examiners.*

Compulsory order of examinations (Article 7.2)

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	Entry requirements
Advanced Logic	- Introduction to Logic
Autonomous Systems Practical	- Autonomous Systems
Bachelor's Project	- At least135 ECTS from the Bachelor's phase - Statistics - Research Methods
Cognitive Science Practical	- Cognitive Psychology - Statistics
Knowledge Technology Practical	- Knowledge and Agent Technology
Language and Speech Technology	- General Linguistics
Language Technology Practical	- Language and Speech Technology - Natural Language Processing
Natural Language Processing	- Logical Programming
Neural Networks	- Linear Algebra
Neurophysics	- Calculus - Linear Algebra
Research Methods	- Statistics