



Appendices for the Master's degree programme in Artificial Intelligence 2026 – 2027

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Appendix I. Learning outcomes of the Master's degree programme (Art. 3.1)

1. The master graduate demonstrates knowledge, understanding and the ability to evaluate, analyse and interpret relevant data, all on a level that builds on and surpasses the level of the bachelor Artificial Intelligence, in at least five (four, for the master graduate in Artificial Intelligence track Science, Business and Policy) of the research areas below. In one research area of Artificial Intelligence the master has specialised knowledge at an advanced level.
 - a. The symbolic approach to Artificial Intelligence
 - b. The numerical, non-symbolic approach to Artificial Intelligence
 - c. Computational theories of perception and cognition
 - d. Agent systems
 - e. Linguistics and language technology
 - f. Autonomous systems and robotics
 - g. Machine learning and pattern recognition
2. The master graduate, except for the master graduate in track Science Business and Policy, demonstrates knowledge and understanding, on a level that builds on and surpasses the level of the bachelor Artificial Intelligence, in the empirical sciences (Psychology, Biology and Physics) and has experience applying and analysing results thereof.
3. The master graduate demonstrates relevant knowledge and the ability to apply methods and techniques from mathematics and logic used in Artificial Intelligence.
4. The master graduate demonstrates relevant knowledge and the ability to use algorithms, data structures and important programming languages used in Artificial Intelligence.
5. The master graduate has the ability to, on an international academic level, analyse problems, critically and constructively review both one's own and other scientific results, even if incomplete, and communicate about this both individually as in a group, both oral and in written form, also in a broader societal context, to both specialists and non-specialists.
6. The master has the ability to critically reflect on their own working method and knowledge and to recognize the need for continued learning on a high degree of autonomy, and is able to understand the scientific developments within the field of Artificial Intelligence.

Additionally, the master graduate in Artificial Intelligence in the track Science, Business and Policy,

7. has an understanding of the way in which businesses and policy organizations are functioning (governments and non-governmental organizations, NGO's).
8. understands the connections between natural science research, business, and policy.
9. is able to integrate aspects of natural science, business and management.
10. has developed their social and communicative skills, is able to work project-based, and is capable of taking professional responsibility.



Appendix II. Tracks/Specialisations (Art. 3.6)

The Artificial Intelligence MSc programme offers two main options, described in detail in Appendix III and IV:

MSc AI programme with specialisation

The MSc Artificial Intelligence offers five specialisations in the regular programme:

- a) AI Engineering
- b) Hybrid Intelligence
- c) Machine Learning
- d) Multi-Agent Systems
- e) Robotics

MSc AI programme with SBP track

Instead of the regular programme with a specialisation, the MSc Artificial Intelligence programme offers a track in Science, Business and Policy (SBP), which combines a shortened AI programme with a preparation for professions in a societal, political and/or commercial context.



Appendix III. Content of the degree programme (Art. 3.7.1)

- MSc Artificial Intelligence programme with specialisation
- MSc Artificial Intelligence programme with SBP track

MSc Artificial Intelligence programme with specialisation

The MSc AI with specialisation consists of:

- Mandatory course units (75 ECTS; Table 1).
- Specialisation course units (20 ECTS; Appendix IV, Table 3).
- Elective course units (25 ECTS; Appendix IV, Table 3 & 4).

Course details including entry requirements, modes of instruction, modes of assessment and examination are described in OCASYS.

Table 1. Mandatory course units

Course code	Course unit name	ECTS
WMAIo30-05	Advanced Machine Learning	5
WMAIo17-05	Deep Learning	5
WMAIo04-05	Design of Multi-Agent Systems	5
WMAIo901-45	Final Research Project	45
WMAIo26-05	Methodology in Artificial Intelligence	5
WMAIo31-05	Natural Language Processing with Deep Learning	5
WMAIo29-05	Responsible AI	5

MSc Artificial Intelligence programme with SBP track

The MSc AI with SBP track consists of:

- Mandatory course units from the MSc Artificial Intelligence programme and the SBP programme (45 ECTS and 60 ECTS, respectively; Table 2).
- Elective course units from the MSc Artificial Intelligence programme (15 ECTS; Appendix IV, Table 5).

Course details including entry requirements, modes of instruction, modes of assessment and examination are described in OCASYS.

Table 2. Mandatory course units

Course code	Course unit name	ECTS
<i>Artificial Intelligence Programme</i>		
WMAIo30-05	Advanced Machine Learning	5
WMAIo17-05	Deep Learning	5
WMAIo04-05	Design of Multi-Agent Systems	5
WMAIo26-05	Methodology in Artificial Intelligence	5
WMAIo31-05	Natural Language Processing with Deep Learning	5
WMAIo39-15	Research Project AI for SBP	15
WMAIo29-05	Responsible AI	5
<i>SBP Programme</i>		
WMSE001-10	Introduction Science and Business	10



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WMSE002-10	Introduction Science and Policy	10
WMSE902-40	Work Placement Business and Policy	40



Appendix IV. Electives (Art. 3.8.1)

- MSc Artificial Intelligence programme with specialisation
- MSc Artificial Intelligence programme with SBP track

MSc Artificial Intelligence programme with specialisation

In addition to the mandatory programme, the programme consists of 20 ECTS specialisation courses and 25 ECTS elective courses.

The programme offers five specialisations, which constitute coherent sets of elective courses that cover a particular subfield of Artificial Intelligence:

- AI Engineering
 - Scalable Computing [WMCS017-05]
 - Cloud Computing and Cloud-based Applications [WMCS032-05]
 - Introduction to Data Science [WMCS022-05]
 - Machine Learning Systems Deployment and Operations [WMCS039-05]
- Hybrid Intelligence
 - Advanced Hybrid Intelligence [WMAI036-05]
 - Cognitive Engineering [WMCC001-05]
 - Human-Robot Interaction for Social Robots [WMAI027-05]
 - Non-Invasive Brain-Computer Interfaces [WMCC016-05]
- Machine Learning
 - Deep Reinforcement Learning [WMAI024-05]
 - Deep Learning Practical [WMAI034-05]
 - Multi-agent Reinforcement Learning [WMAI033-05]
 - Unsupervised Deep Learning [WMAI038-05]
- Multi-Agent Systems
 - Arguing Agents [WMAI001-05]
 - Collective Intelligence [WMAI023-05]
 - Computational Game Theory [WMAI035-05]
 - Logical Aspects of Multi-Agent Systems [WMAI020-05]
- Robotics
 - Cognitive Robotics [WMAI003-05]
 - Control Methods for Robotics [WMAI037-05]
 - Human-Robot Interaction for Social Robots [WMAI027-05]
 - Robotics for AI [WMAI011-05]

It is strongly advised to follow a complete 20 ECTS specialisation. However, students are also allowed to do an open specialisation consisting of 20 ECTS of self-selected courses *from Table 3 and 4 that are marked as part of a specialisation.*

In addition to the 20 ECTS specialisation, 25 ECTS worth of elective course units have to be completed. Electives can be chosen from the list of electives of the Artificial Intelligence and Computational Cognitive Science programme (Table 3), pre-approved electives of other programmes (Table 4), or free electives (electives that have not been pre-approved). Students must request formal approval from the Board of Examiners to include free electives.



Table 3. Elective course units from AI & CCS

Course code	Course unit name	Part of specialisation	ECTS
WMAIo36-05	Advanced Hybrid Intelligence	X	5
WMCCo05-05	Advanced Statistical Modelling		5
WMCCo28-05	AI in Education		5
WBAIo40-10	Artificial Intelligence Challenges		10
WMAIo01-05	Arguing Agents	X	5
WMCCo01-05	Cognitive Engineering	X	5
WMCCo19-05	Cognitive Modelling		5
WMCCo22-05	Cognitive Neural Networks		5
WMAIo03-05	Cognitive Robotics	X	5
WMAIo23-05	Collective Intelligence	X	5
WMCCo10-05	Computational Cognitive Neuroscience		5
WMAIo35-05	Computational Game Theory	X	5
WMCCo09-05	Computational Simulations of Language		5
WMAIo16-05	Computational Social Choice		5
WMAIo37-05	Control Methods for Robotics	X	5
WMAIo24-05	Deep Reinforcement Learning	X	5
WMAIo34-05	Deep Learning Practical	X	5
WMAIo43-05	Fundamental Proofs in AI		5
WMCCo23-05	Human-Centred AI		5
WMAIo27-05	Human-Robot Interaction Social Robots	X	5
WMAIo42-05	Legal Aspects of AI ^a		5
WMAIo20-05	Logical Aspects of Multi-Agent Systems	X	5
WMCCo14-05	Models of Human-Syntax Processing		5
WMAIo33-05	Multi-agent Reinforcement Learning	X	5
WMAIo28-05	Neuroprosthetics		5
WMCCo16-05	Non-Invasive Brain-Computer Interfaces	X	5
WMCCo30-05	Realtime Non-Invasive Brain-Computer Interfaces		5
WMAIo11-05	Robotics for AI	X	5
WMAIo38-05	Unsupervised Deep Learning	X	5
WMCCo25-05	User-Centred Design		5
WMCCo21-05	User Modelling		5

^a Students who completed the course WBAIo84-05 are not allowed to take this course.

Table 4. Pre-approved elective course units from other degree programmes

Course code	Course unit name	Part of specialisation	ECTS
LIXo06Mo5	Advanced Topics in Natural Language Processing		5
WMCS032-05	Cloud Computing and Cloud-Based Applications	X	5



LIX021M05	Computational Semantics		5
WMCS015-05	Computer Vision		5
WMCS052-05	Data Privacy		5
WMCS030-05	Ethical Hacking		5
WMCS042-05	Intelligent Mobile Perception in Practice		5
WMCS002-05	Introduction to Data Science	X	5
LIX025M05	Language Technology Project		5
WMCS039-05	Machine Learning Systems Deployment and Operations	X	5
WMCS027-05	Modal Logic and Proof Theory		5
WMCS026-05	Models and Semantics of Computation		5
WMCS041-05	Multimodal Mobile Sensing		5
WMPH044-05	Neuromorphic Circuit Design		5
WMIE038-05	Robotics and Automation		5
WMCS040-05	Robotic State Estimation		5
WMEC006-05	Skills in Science Communication		5
WMCS017-05	Scalable Computing	X	5
WMCS018-05	Scientific Visualization		5
LIX002M05	Semantic Web Technology		5
WMCS028-05	Social Network Analysis		5
WMCS038-05	Theory of Machine Learning		5

MSc Artificial Intelligence programme with SBP track

In addition to the mandatory programme, the programme consists of 15 ECTS in electives from the MSc AI programme. Electives must be chosen from the list of electives below (Table 5).

Table 5. Elective course units from AI

Course code	Course unit name	ECTS
WMAI036-05	Advanced Hybrid Intelligence	5
WMAI001-05	Arguing Agents	5
WMAI003-05	Cognitive Robotics	5
WMAI023-05	Collective Intelligence	5
WMAI035-05	Computational Game Theory	5
WMAI016-05	Computational Social Choice	5
WMAI037-05	Control Methods for Robotics	5
WMAI024-05	Deep Reinforcement Learning	5
WMAI034-05	Deep Learning Practical	5
WMAI043-05	Fundamental Proofs in AI	5
WMAI027-05	Human-Robot Interaction Social Robots	5
WMAI042-05	Legal aspects of AI ^a	5
WMAI020-05	Logical Aspects of Multi-Agent Systems	5
WMAI033-05	Multi-agent Reinforcement Learning	5



WMAIo28-05	Neuroprosthetics	5
WMAIo11-05	Robotics for AI	5
WMAIo38-05	Unsupervised Deep Learning	5

^a Students who completed the course WBAIo84-05 are not allowed to take this course.



Appendix V. Entry requirements and compulsory order (Art. 4.4)

The examinations for the course units listed in Table 6, may not be taken before the examinations for the associated course units have been passed:

Table 6. Entry requirements

Course unit name and code	Entry requirements
Deep Reinforcement Learning [WMAIo24-05]	Deep Learning [WMAIo17-05]
Final Research Project [WMAIo901-45]	At least 60 ECTS from the master's programme Advanced Machine Learning [WMAIo30-05] Methodology in AI [WMAIo26-05]
Multi-agent Reinforcement Learning [WMAIo33-05]	Deep Reinforcement Learning [WMAIo24-05]
Unsupervised Deep Learning	Deep Learning [WMAIo17-05]
Work Placement Business and Policy [WMSE902-40]	At least 45 ECTS from the master's programme Introduction Science and Business [WMSE001-10] Introduction Science and Policy [WMSE002-10]



Appendix VI. Admission to the degree programme (Art. 2.1A.1, 2.1A.1 2.1B.1)

The Artificial Intelligence Master programme has a selection procedure. This means that an applicant must both meet the admission requirements and successfully complete a selection procedure in order to be admitted to the programme.

1. Requirements for admission to the selective Master's degree programme Artificial Intelligence

Applicants have to fulfill the following admission requirements:

- An academic Bachelor's degree in:
 - Artificial Intelligence (CROHO/RIO 56981 or 56945)
 - Data Science and Artificial Intelligence (CROHO/RIO 50300)
 - Cognitive Science and Artificial Intelligence (CROHO/RIO 59338)
 - Computing Science from University of Groningen (CROHO/RIO 56978)
 - or a related field including the following key subjects: Calculus, Linear Algebra, Probability & Statistics, Advanced Programming, Machine Learning, Advanced Logic, Neural Networks, Research Methodology Skills.
- Sufficient English proficiency: see basic TER Article 2.2

2. Application procedure

All candidates have to file an admission request through the application website of the University of Groningen (UG). before 1 May to start in September. The details of the application procedure are published on the *Admission and Application* section of the UG website.

3. Selection procedure

In order to select academically suited and motivated students, the Admission Board requires a complete selection file from all candidates. The Admission Board will review all individual applicants on the basis of their selection file; each applicant is evaluated by at least two members of the board. All admissible candidates will be rated on the selection criteria 'academic performance' (A) and 'motivation' (B), as specified below.

A. Academic performance

- a. **Relevance and affiliation/fit** of the followed bachelor programme to the master programme (list of subjects/courses followed and grades obtained; brief description of the content of key subjects/courses demonstrating the knowledge and skill(s) acquired by the student).

Key subjects:

Calculus, Linear Algebra, Probability & Statistics, Advanced Programming, Machine Learning, Advanced Logic, Neural Networks, Research Methodology Skills

Please consult our online catalogue www.rug.nl/ocasys/ for the intended learning outcomes of the course units that adhere to these subjects.

- b. **Proficiency** in: (1) formulating scientific research questions and completing an academic assignment in the context of the programme, and in individually producing a written report on the assignment topic. The report has to reflect the student's ability to produce a well-structured and concise report, adhering to the rules of scientific writing. The assignment handed in is free of choice, and can be a bachelor thesis; report on a practicum, experiment, or field-work; a literature review; a published peer-reviewed research paper, etc.¹ (2) programming for machine learning, image processing, robotics, and/or knowledge-based & multi-agent systems. (3) advanced statistical data analysis.



¹If the student has not made an individually written report during the bachelor programme but has a report written together with another student, this can be used and the contribution needs to be indicated. An alternative option is that they should contact the selection committee to receive an assignment on the basis of which a written report can be prepared.

B. Motivation

The candidate has to provide a motivation (max 500 words) for the application, by answering the following questions:

1. *Why did you choose this specific master's degree programme?*
2. *How did the bachelor's degree programme, extracurricular activities, and/or other experiences prepare you for this specific master programme?*
3. *In case it took you longer than nominal to acquire the bachelor degree, please briefly explain the cause(s) of the delay.*
4. *How does this master's degree programme prepare you for your future career and/or serve your ambitions?*
5. *The master programme contains a large research project of 45 ECTS. In which research direction(s) at the University of Groningen would you like to carry out your project? Please motivate your choices.*
6. *Free space to mention anything you feel is relevant and is not addressed by the questions above.*

Timeline for the application and selection procedure

The application procedure for the start on the 1st of September will open on the 1st of October of the previous year and close on the 1st of May. The details of the entire application procedure are published on the *Admission and Application* section of the UG website.

The Admission Board will carry out the selection procedure according to the deadlines set by the Admission office.

Candidates who are not selected can lodge a written appeal against this decision within four weeks of the date of sending, with the Board of Appeal for Examinations, P.O. Box 72, 9700 AB Groningen, the Netherlands.



Appendix VII. Pre-master programmes and Fast-Track programmes (Art. 2.3)

A. Pre-Master's programmes

1. The Artificial Intelligence programme is selective, as described in Appendix VI; the Board of Admissions of the programme may decide to not accept admission.

To meet the admission requirements for students with a background other than described in Appendix VI, point 1, the programmes offers several predetermined Pre-Master's programmes of 40-50 ECTS (Table 7.1-7.3) for access to the MSc Artificial Intelligence and individually determined Pre-Master's programmes. The pre-master's programmes are to be completed in the year before starting the MSc Artificial Intelligence. Starting date for a pre-master programme is 1 September.

Please note that the pre-master programmes below are indications; prospective students must contact the Academic Advisor before starting a pre-master programme.

- a. Pre-master programme 1

Pre-master programme 1 (Table 7.1) is for students with a Bachelor's degree (except Artificial Intelligence and Computing Science) from the Faculty of Science and Engineering from the University of Groningen (UG) and for students with a Bachelor's degree in Econometrics from the UG. The Admission Board may decide to include/exclude different courses on an individual basis.

Table 7.1 Pre-master programme 1

Course code	Course unit name	ECTS	Period
<i>Semester 1</i>			
WBAI003-05	Imperative Programming	5	Ia-Ib
WBAI057-05 WBAI067-05	Knowledge and Agent Systems OR Introduction to Robotics	5	Ia Ia
WBAI056-05	Introduction to Machine Learning	5	Ia
WBAI012-05	Introduction to Logic	5	Ib
<i>Semester 2</i>			
WBAI018-05	Algorithms and Data Structures	5	IIa
WBAI011-05 WBAI045-05 WBAI017-05	Data Analytics and Communication OR Object-Oriented Programming (for AI) OR Advanced Logic	5	IIb Ib IIa
WBAI063-05	Fundamental Artificial Intelligence	5	IIb
WBAI065-05	Applied Machine Learning	5	IIb
Total		40	

- b. Pre-master programme 2

Pre-master programme 2 (Table 7.2) is for students with a relevant Bachelor degree without a Scientific background. The Admission Board may decide to include/exclude different courses on an individual basis.



Table 7.2 Pre-master programme 2

Course code	Course unit name	ECTS	Period
<i>Semester 1</i>			
WBAIo03-05	Imperative Programming	5	Ia-Ib
WBAIo48-05	Calculus for Artificial Intelligence	5	Ia-Ib
WBAIo56-05	Introduction to Machine Learning	5	Ia
WBAIo12-05	Introduction to Logic	5	Ib
<i>Semester 2</i>			
WBAIo18-05	Algorithms and Data Structures	5	IIa
WBAIo17-05 WBAIo45-05	Advanced Logic OR Object-Oriented Programming	5	IIa Ib
WBAIo63-05	Fundamental Artificial Intelligence	5	IIb
WBAIo65-05	Applied Machine Learning	5	IIb
WBAIo50-05	Linear Algebra and Multivariable Calculus	5	IIb
Total		45	

c. Pre-master programme 3

Pre-master programme 3 (Table 7.3) is for students with a Bachelor's degree in Information Science or Data Science & Society from the UG. The Admission Board may decide to include/exclude different courses on an individual basis.

Table. 7.3 Pre-master programme 3

Course code	Course name	ECTS	Period
<i>Semester 1</i>			
WBAIo03-05	Imperative Programming	5	Ia-Ib, focus in Ia
WBAIo48-05	Calculus for Artificial Intelligence	5	Ia-Ib, focus in Ib
WBAIo57-05	Knowledge and Agent Systems	5	Ia
WBAIo12-05	Introduction to Logic	5	Ib
<i>Semester 2</i>			
WBAIo18-05	Algorithms and Data Structures	5	IIa
WBAIo17-05 WBAIo45-05	Advanced Logic OR Object-oriented Programming	5	IIa Ib
WBAIo63-05	Fundamental Artificial Intelligence	5	IIb
WBAIo50-05	Linear Algebra and Multivariable Calculus	5	IIb
Total		40	

d. Pre-master programme 4

Pre-master programme 4 (Table 7.4) is for students with a relevant HBO degree (e.g. HBO-ICT from Hanze University; CROHO/RIO 30020). The Admission Board may decide to include/exclude different courses on an individual basis.



Table 7.4 Pre-master programme 4

Course code	Course unit name	ECTS	Period
<i>Semester 1</i>			
WBAIo48-05	Calculus for Artificial Intelligence	5	Ia-Ib
WBAIo56-05	Introduction to Machine Learning	5	Ia
WBAIo57-05	Knowledge and Agent Systems	5	Ia
WBAIo12-05	Introduction to Logic	5	Ib
<i>Semester 2</i>			
WBAIo17-05	Advanced Logic	5	IIa
WBAIo18-05	Algorithms and Data Structures	5	IIa
WBAIo59-05	Natural Language Processing	5	IIa
WBAIo65-05	Applied Machine Learning	5	IIb
WBAIo50-05	Linear Algebra and Multivariable Calculus	5	IIb
WBAIo49-05	Statistics	5	IIb
Total		50	

2. For holders of a HBO diploma not listed above, or for holders of a Dutch or foreign degree not listed in Appendix VI, the Board of Admissions decides:
 - a. The content and student workload of a tailor-made Pre-Master's programme.
or
 - b. Admission is granted
or
 - c. Admission is not granted
3. For selective Masters, Pre-Master's students are selected on the basis of the selection criteria and selection procedure as described in Appendix VI.

B. Fast-Track programmes

The MSc degree programme does not offer Fast-Track programmes.



Appendix VIII. Transitional provisions (Art. 7.1)

For students who were registered in the programme before 2026-2027, 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 have completed a discontinued course (Table 8.1-8.2) are excluded from taking the respective replacement course and can still count the discontinued course as part of their programme.

Any cases not listed in the Teaching and Examination Regulations, through either the current curriculum or the transitional provisions, are to be handled by the Board of Examiners.

Students who started in 2025-2026 or before:

Table 8.1

Discontinued course unit			Replacement course unit		
Course Code	Course Name	ECTS	Course Code	Course Name	ECTS
WMAI021-05	Pattern Recognition (for AI)	5	NA		
WMCC020-05	Psycholinguistics and Cognition	5	NA		
WMAI032-05	Trustworthy and Explainable AI	5	NA		

Students who started in 2023-2024 or before:

Table 8.2

Discontinued course unit			Replacement course unit		
Course Code	Course Name	ECTS	Course Code	Course Name	ECTS
WMAI019-05	Handwriting Recognition	5	WMAI034-05	Deep Learning Practical	5
WMAI010-05	Machine Learning	5	WMAI030-05	Advanced Machine Learning	5
WMAI025-05	Topics in AI	5	WMAI029-05	Responsible AI	5

From 24-25 onwards, Natural Language Processing with Deep Learning [WMAI031-05] is part of the mandatory programme. Students who started in 23-24 or before do not have to include this course in their mandatory programme, provided they still obtain a total of 120 ECTS.



Appendix IX. Additional requirements Open Degree programmes (Art. 3.9.2)

Students wishing to pursue an open degree programme in Artificial Intelligence may file a request with the Board of Examiners; an Open Degree Programme must always be approved in advance. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the Artificial Intelligence programme. An Open Degree Programme in Artificial Intelligence must include the mandatory courses described in Appendix III, Table 1.