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Appendices for the Master's degree programme in Computational Cognitive Science 2025 – 2026

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Appendix I Learning outcomes of the 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 three of the research areas below. In one research area of Computational Cognitive Science the master has specialised knowledge at an advanced level.

   a. Computational theories and models of cognitive processes
   b. Multivariate statistics
   c. Cognitive ergonomics
   d. Application of formal models of cognition in human-computer interaction and education
   e. Linguistics and language technology
   f. Cognitive neuroscience

2. The master graduate 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 Computational Cognitive Science.

4. The master graduate demonstrates relevant knowledge and the ability to use programming languages used in the field of Computational Cognitive Science.

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 to communicate about this both individually and in a group, both orally and in written form, also in a broader societal context, to both specialists and nonspecialists.

6. The master graduate has the ability to critically reflect on their own working method and knowledge and to recognize the need for continued learning with a high degree of autonomy, and is able to understand the scientific developments within the field of Computational Cognitive Science.

Appendix II Tracks/Specialisations (art. 3.6)

The Computational Cognitive Science MSc Programme has **no tracks**.

Specialisations
The Computational Cognitive Science MSc programme offers three specialisations:

a) Cognitive Modelling and the Brain
b) Human-Centred Artificial Intelligence
c) Human Language Modelling

Alternatively, students can do an open specialisation consisting of a set of self-selected courses in consultation with and after approval of the Board of Examiners.

Appendix III Content of the degree programme (art. 3.8)

The master programme consists of:

- Mandatory course units (75 ECTS; Table 1).
- Specialisation course units (15 ECTS; Appendix IV, Table 2).
- Elective course units (30 ECTS; Appendix IV, Table 3 and 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
WMCC005-05	Advanced Statistical Modelling	5
WMCC019-05	Cognitive Modelling	5
WMCC901-45	Final Research Project CCS	45
WMCC023-05	Human-Centred Artificial Intelligence	5
WMCC017-05	Machine Learning for Computational Cognitive Science	5
WMCC015-05	Methods in CCS	5
WMCC018-05	Modelling of Human Language	5

Appendix IV Electives (art. 3.9.1)

In addition to the mandatory programme, the programme consists of a 15 ECTS specialisation and 30 ECTS in electives.

The programme offers three specialisations (Table 2), which constitute coherent sets of elective courses that cover a particular subfield of Computational Cognitive Science:

- Cognitive Modelling and the Brain
- Human-Centred Artificial Intelligence
- Human Language Modelling

Table 2. Specialisations

Cognitive Modelling and the Brain

Course code	Course name	ECTS
WMCC022-05	Cognitive Neural Networks	5
WMCC010-05	Computational Cognitive Neuroscience	5
WMCC016-05	Non-Invasive Brain-Computer Interfaces	5

Human-Centred Artificial Intelligence

Course code	Course name	ECTS
WMCC001-05	Cognitive Engineering	5
WMCC025-05	User-Centred Design	5
WMCC021-05	User Modelling	5

Human Language Modelling

Course code	Course name	ECTS
WMCC009-05	Computational Simulations of Language	5
WMCC014-05	Models of Human-Syntax Processing	5
WMCC020-05	Psycholinguistics and Cognition	5

Electives can be chosen from the list of electives of the Computational Cognitive Science and Artificial Intelligence 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 CCS & AI

Course code	Course unit name	ECTS
WMCC026-05	Advanced Analysis of Brain and Behaviour	5
WMAI036-05	Advanced Hybrid Intelligence	5
WMAI030-05	Advanced Machine Learning	5
WMCC028-05	AI in Education	5
WMAI040-10	Artificial Intelligence Challenges [a]	10
WMAI001-05	Arguing Agents	5
WMCC001-05	Cognitive Engineering	5
WMCC022-05	Cognitive Neural Networks	5
WMAI003-05	Cognitive Robotics	5
WMAI023-05	Collective Intelligence	5

WMCC010-05	Computational Cognitive Neuroscience	5
WMAI035-05	Computational Game Theory	5
WMCC009-05	Computational Simulations of Language	5
WMAI016-05	Computational Social Choice	5
WMAI037-05	Control Methods for Robotics	5
WMAI017-05	Deep Learning	5
WMAI034-05	Deep Learning Practical	5
WMAI004-05	Design of Multi-Agent Systems	5
WMCC027-15	First Year Project [a]	15
WMAI027-05	Human-Robot Interaction for Social Robots	5
WMAI020-05	Logical Aspects of Multi-Agent Systems	5
WMCC014-05	Models of Human-Syntax Processing	5
WMAI033-05	Multi-agent Reinforcement Learning	5
WMAI031-05	Natural Language Processing with Deep Learning	5
WMCC011-05	Neuro-ergonomics	5
WMAI028-05	Neuroprosthetics	5
WMCC016-05	Non-Invasive Brain-Computer Interfaces	5
WMAI021-05	Pattern Recognition (for AI)	5
WMCC020-05	Psycholinguistics and Cognition	5
WMAI011-05	Robotics for AI	5
WMAI032-05	Trustworthy and Explainable AI	5
WMCC025-05	User-Centred Design	5
WMCC021-05	User Modelling	5

[a] *One can take either Artificial Intelligence Challenges or First Year Project, and will only be awarded credit points for one of the two course units.*

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

Course code	**Course unit name**	**ECTS**
LIX006M05	Advanced Topics in Natural Language Processing	5
WMBC002-05	Auditory and Visual Perception	5
LIX021M05	Computational Semantics	5
LTR024M05	Corpus Linguistics	5
WMSE001-10	Introduction Science and Business [b]	10
WMSE002-10	Introduction Science and Policy [b]	10
WMCS002-05	Introduction to Data Science	5
LIX025M05	Language Technology Project	5
LIX001M05	Natural Language Processing	5
FI184FR	Philosophy of Neuroscience	5
WMCS018-05	Scientific Visualization	5
LIX002M05	Semantic Web Technology	5
WMEC006-05	Skills in Science Communication	5

[b] *This course yields 10 ECTS credit points. One can take either Introduction Science and Business or Introduction Science and Policy, and will only be awarded credit points for one of the two course units.*

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

The examinations for the course units listed in Table 5 may not be taken before the examinations for the associated course units have been passed:

Table 5. Entry requirements

Course unit name and code	**Entry requirements**
Final Research Project [WMCC901-45]	At least 60 ECTS credit points from the master's programme Cognitive Modelling [WMCC019-05] Human-Centred AI [WMCC023-05] Methods in CCS [WMCC015-05] Modelling of Human Language [WMCC018-05]
Models of Human-Syntax Processing [WMCC014-05]	Cognitive Modelling [WMCC019-05]
User Modelling [WMCC021-05]	Cognitive Modelling [WMCC019-05] or Architectures of Intelligence [WBAI009-05] *or* Cognitive Neuroscience 2: Modelling the Mind [WMBC028-05]

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Appendix VI Admission to the degree programme (art. 2.1A.1 + 2.1B.1)

Holders of a certificate from the following Bachelor's degree programmes are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Computational Cognitive Science on that basis:

- Artificial Intelligence of the University of Groningen
- Information Science of the University of Groningen

For holders of another Bachelor's degree in Artificial Intelligence, Psychology, Cognitive Science, or other relevant programmes there is an individual admission procedure based on the content of the respective bachelor's programme and language skills. The Board of Admissions of Computational Cognitive Science will assess the application and decide whether the applicant has sufficient background to register for the programme.

Appendix VII Pre-master programmes

- **Pre-master programme 1**
- **Pre-master programme 2**
- **Pre-master programme 3**

FSE offers predetermined Pre-Master's programmes (Table 8.1-8.3) and individually determined Pre-Master's programmes for the MSc Computational Cognitive Science for students with a relevant Dutch degree. The Board of Admissions may decide to not accept admission. Starting date for a pre-master programme is 1 September.

Pre-master programme 1

Pre-master programme 1 (Table 8.1) is for students with a Bachelor's degree in Psychology from the University of Groningen (UG). The Admission Board may decide to include/exclude different courses on an individual basis.

Table 8.1 Pre-master programme 1 (UG Psychology)

Course code	**Course unit name**	**ECTS**	**Period**
Semester 1			
WBAI003-05	Imperative Programming (for AI)	5	Ia-Ib
WBAI056-05 WBAI063-05	Introduction to Machine Learning OR Fundamental Artificial Intelligence	5	Ib IIb
WBAI009-05	Architectures of Intelligence	5	Ib
Semester 2			
WBAI018-05	Algorithm and Data Structures	5	IIa
Total		**20**	

Pre-master programme 2

Pre-master programme 2 (Table 8.2) is for students with a relevant Bachelor's degree from a Dutch University (e.g., Cognition, Language and Communication, Communicatie- en Informatiewetenschappen, or a degree in Brain Science). The Admission Board may decide to include/exclude different courses on an individual basis.

Table 8.2 Pre-master programme 2 (relevant Dutch degrees)

Course code	Course unit name	ECTS	Period
Semester 1			
WBAI003-05	Imperative Programming (for AI)	5	Ia-Ib
WBAI074-05	Introduction to Neuroscience	5	Ia
WBAI049-05	Statistics	5	Ia
WBAI056-05	Introduction to Machine Learning	5	Ib
WBAI009-05	Architectures of Intelligence	5	Ib
Total		**25**	

Pre-master programme 3

Pre-master programme 3 (Table 8.3) is for students with a relevant HBO degree (e.g. Game design, Data Science & AI). The Admission Board may decide to include/exclude different courses on an individual basis.

Table 8.3 Pre-master programme 3

Course code	Course unit name	ECTS	Period
Semester 1			
WBAI003-05 WBAI018-05	Imperative Programming (for AI) OR Algorithms and Data Structures	5	Ia-Ib IIa
WBAI074-05	Introduction to Neuroscience	5	Ia
WBAI049-05	Statistics	5	Ia
WBAI056-05	Introduction to Machine Learning	5	Ib
WBAI009-05	Architectures of Intelligence	5	Ib
Semester 2			
FI203AI	Philosophy of AI and Cognition	5	IIa
WBAI077-05	Computational Methods in Neuroscience Practical	5	IIa
WBAI022-05 WBAI059-05	General Linguistics OR Natural Language Processing	5	IIb IIa
WBAI011-05	Data Analytics and Communication	5	IIb
WBAI063-05	Fundamental Artificial Intelligence	5	IIb
Total		**50**	

Appendix VIII Transitional provisions (art. 7.1)

For students who were registered in the programme before 2025-2026, 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 are excluded from taking the respective replacement course.

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 2024-2025 or before:

Table 6.1

Discontinued course unit			**Replacement course unit**		
Course Code	**Course Name**	**ECTS**	**Course Code**	**Course Name**	**ECTS**
WMCC024-05	Applied Cognitive Modelling	5	WMCC028-05	AI in Education	5

From 2025-2026 onwards, Unsupervised Deep Learning [WMAI038-05] is no longer offered. Students who started in 24-25 or before are still allowed to count this course as an elective.

Students who started in 2023-2024 or before:

Table 6.2

Discontinued course unit			**Replacement course unit**		
Course Code	**Course Name**	**ECTS**	**Course Code**	**Course Name**	**ECTS**
WMCC007-05	Applied Cognitive Engineering	5	WMCC025-05	User-Centred Design	5
WMCC006-05	Cognitive Modelling: Basic Principles and Methods	5	WMCC019-05	Cognitive Modelling	5
WMCC008-05	Cognitive Modelling: Complex Behaviour	5	WMCC024-05	Applied Cognitive Modelling	5
WMCC003-05	Language Modelling	5	WMCC020-05	Psycholinguistics and Cognition	5
WMCC004-05	User Models	5	WMCC021-05	User Modelling	5

From 24-25 onwards, Human-Centred AI [WMCC023-05] and Modelling of Human Language [WMCC018-05] are part of the mandatory programme. Students who started in 23-24 or before do not have to include these courses in their mandatory programme, provided they still obtain a total of 120 ECTS.

The discontinued course Formal Models of Cognition [WBCC002-05] is accepted as a valid course for students who started in 23-24 or before. Students who have completed this course do not have

to complete Human-Centred AI [WMCC023-05] and Modelling of Human Language [WMCC018-05] to start their Final Research Project.

Students who started in 23-24 can still opt to do an internship and a 30 ECTS Final Research Project, instead of doing a 45 ECTS Final Research Project.

Students who started in 2022-2023 or before:

From 23-24 onwards, Machine Learning for CCS [WMCC017-05] is part of the mandatory programme. Students who started in 22-23 or before do not have to include this course in their mandatory programme, provided they still obtain a total of 120 ECTS.

Appendix VIII Additional requirements Open degree programmes (art. 3.10)

Students are permitted to obtain a diploma in the Computational Cognitive Science MSc 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 MSc Project in the field of Computational Cognitive Science, to guarantee they are able to function as a MSc 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 MSc Framework of Reference of the Netherlands.