



Appendices Master's degree programme Computational Cognitive Science 2024 – 2025

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Appendix I Learning outcomes of the degree programme (Article 3.1)

1. The master 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 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 demonstrates relevant knowledge and the ability to apply methods and techniques from mathematics and logic used in Computational Cognitive Science.
4. The master demonstrates relevant knowledge and the ability to use programming languages used in the field of Computational Cognitive Science.
5. The master 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 has the ability to critically reflect on his/her 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/Specializations of the degree programme (Article 3.6)

The Computational Cognitive Science MSc Programme has no tracks.

The Computational Cognitive Science MSc Programme has three specializations. These specializations act as recommendations for students on which electives to take, if they want to gain expertise in a certain field.

Students can choose one of the following specializations:

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

Students are also able to take an open specialization, which allows them to select courses themselves.



Appendix III Content of the degree programme (Article 3.8)

The master programme consists of mandatory courses (75 ECTS), specialization courses or elective courses (45 ECTS, see appendix IV). Course details including modes of instruction, and modes of assessment are described in OCASYS.

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	45
WMC023-05	Human-Centred AI	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 Elective course units (Article 3.9.1)

In addition to the general mandatory programme, students can take the suggested course units of one of the three specializations (15 ECTS).

Specializations and their suggested course units

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
WMCC020-05	Psycholinguistics and Cognition	5
LIX025M05	Language Technology Project	5

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

In addition to the general mandatory course units and the suggested mandatory course units, the programme comprises elective course units (30 ECTS). Students can either choose pre-approved electives or free electives. For free electives they need to request the formal approval of the Board of Examiners.

Pre-approved elective course units from AI/CCS

Course code	Course unit name	ECTS
WMCC026-05	Advanced Analysis of Brain and Behavior	5
WMAI036-05	Advanced Hybrid Intelligence	5
WMAI030-05	Advanced Machine Learning	5
WMAI031-05	Natural Language Processing with Deep Learning	5
WMCC024-05	Applied Cognitive Modelling	5
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	15
WMAI027-05	Human-Robot Interaction for Social Robots	5
WMAI020-05	Logical Aspects of Multi-Agent Systems	5
WMAI026-05	Methodology in Artificial Intelligence	5
WMCC014-05	Models of Human-Syntax Processing	5
WMAI033-05	Multi-agent Reinforcement 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
WMAI038-05	Unsupervised Deep Learning	5
WMCC021-05	User Modelling	5
WMCC025-05	User-Centred Design	5

Pre-approved elective course units from other degree programmes

Course code	Course unit name	ECTS
PSMCB-4	Applied Cognitive Neuroscience	5
WMBC002-05	Auditory and Visual Perception	5
WMCS032-05	Cloud Computing and Cloud-Based Applications	5
LIX021M05	Computational Semantics	5
LIX022M05	Computer-Mediated Communication	5
LTR024M05	Corpus Linguistics	5
WMSE001-10	Introduction Science and Business ^a	10
WMSE002-10	Introduction Science and Policy ^a	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



WMECo06-05	Skills in Science Communication	5
LIX024M05	User Interface Evaluation	5

^a 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.

Formal approval of the Board of Examiners is required, in case and before a student would like to choose electives which are not on the above lists of pre-approved electives.



Appendix V Entry requirements and compulsory order of examinations (Article 4.4)

Course unit name and code	Entry requirements
Applied Cognitive Modelling [WMCC024-05]	Cognitive Modelling [WMCC021-05] ^b
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 [WMCC006-05] <i>or</i> Cognitive Neuroscience 2: Modelling the Mind [WMBC028-05]

^b Students who passed Architectures of Intelligence [WBAIo09-05] in the BSc AI are exempted from this rule.



Appendix VI Admission to the degree programme (Article 2.1A)

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 or other Dutch university
- Information Science of the University of Groningen



Appendix VII Transitional provisions (Article 7.1)

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 have already 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 treated by the Board of Examiners of the degree programme.

Students who started in 2023-2024 or before:

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 course 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.

Students who started in 2021–2022 or before:

Students do not have to include Methods in CCS [WMCC015-05] in their mandatory programme. They can still include it as a pre-approved elective course unit, provided they still obtain a total of 120 ECTS.



Appendix VIII Additional requirements Open degree programmes (Article 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, 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.