Master Human Machine Communication

Appendix I   Teaching outcomes of the degree programme (art. 1.3)

1. The master demonstrates knowledge, understanding and the ability to evaluate, analyze 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 Human Machine Communication the master has specialized knowledge at a forefront 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- and speech 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 analyzing results thereof.

3. The master demonstrates relevant knowledge and the ability to apply methods and techniques from mathematics and logic used in Human Machine Communication.

4. The master demonstrates relevant knowledge and the ability to use programming languages used in Human Machine Communication.

5. The master has the ability to, on an international academic level, analyze problems, critically and constructive 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, for both specialists and non-specialists.

6. The master has the ability to critically reflect on one's 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 Human Machine Communication.

Appendix II   Specializations of the degree programme (art. 2.2)

Students must choose one of the following specializations:
a)   specialization Cognitive Modeling
b)   specialization Cognitive Engineering
c)   specialization Computational Cognitive Neuroscience
d)   specialization Cognitive Language Modeling

Appendix III   Content of the degree programme (art. 2.3)

1. The **degree programme** consist of the following compulsory modules with a study load of 5 ECTS unless otherwise stated, with their related form of examination:

Compulsory modules with a study load of 5 ECTS, unless otherwise stated	Form of examinations[1]							
	A	CA	RA	IS	PP	RP	WE	PR
Formal Models of Cognition	X				X			
Cognitive Modeling – Basic Principles and Methods	X		X		X			
Multivariate Models *or* Repeated Measures	X X						X X	
Research project (15 ECTS)						X		
Final Research Project (45 ECTS) *or* Final Research Project (30 ECTS) *and* Internship (15 ECTS)				X		X X		

In individual cases the Board of Examiners may define one other compulsory module (5 EC) from the following fields: programming, cognitive psychology, statistics, linguistics or cognitive neuroscience.

2. The different **specializations** also contain the following compulsory modules with a study load of 5 ECTS (with their related form of examination):

Cognitive Modeling

Compulsory modules with a study load of 5 ECTS, unless otherwise stated	Form of examinations[1]							
	A	DA	IA	RA	PP	RP	WE	PR
Cognitive Modeling – Complex Behaviour	X			X	X			
User Models		X			X			
Computational Cognitive Neuroscience	X				X			X

Cognitive Engineering

Compulsory modules with a study load of 5 ECTS, unless otherwise stated	Form of examinations[1]							
	A	DA	IA	RA	PP	RP	WE	PR
Cognitive Engineering		X		X	X		X	
Neuro-ergonomics					X			
User Models		X			X			

Computational Cognitive Neuroscience

Compulsory modules with a study load of 5 ECTS, unless otherwise stated	Form of examinations[1]							
	A	DA	IA	RA	PP	RP	WE	PR
Computational Cognitive Neuroscience	X				X			X
Cognitive Modeling – Complex Behaviour	X			X	X			
Advanced Experimental Skills	X	X			X			

Cognitive Language Modeling

Compulsory modules with a study load of 5 ECTS, unless otherwise stated	Form of examinations[1]							
	A	CA	IA	RA	PP	RP	WE	PR
Language Modeling				X	X			X
Computational Discourse	X	X						X
Computational Simulations of Language Behaviour	X							X

[1]Form of examinations:
A: assignments; **CA**: computer assignment; **DA**: design assignment; **IA**: implementation assignment; **IS**: internship; **RA**: research assignment; **PP**: paper; **RP**: research project; **WE**: written exam; **PR**: oral presentation

Appendix IV   Optional course units (art. 2.4)

1. With the approval of the Board of Examiners, a student may choose one or more of the following optional modules with a study load of 5 ECTS, with their related form of examination:

Elective courses with a study load of 5 ECTS, unless otherwise stated	Form of examinations[1]							
	A	CA	DA	IA	RA	PP	WE	PR
Arguing Agents	X						X	X
Auditory Biophysics					X			X
Cognitive Engineering			X		X	X	X	
Cognitive Modeling – Complex Behaviour	X				X	X		
Cognitive Robotics	X					X		X
Computational Cognitive Neuroscience	X					X		X
Computational Discourse	X	X						X
Design of Multi-Agent Systems				X			X	X
Handwriting Recognition				X		X		X
Language Modeling					X	X		X
Machine Learning				X			X	
Multi-Agent Systems	X			X				X
Neuro-ergonomics						X		
Perception					X	X		X
Robotics			X	X		X		
Signals and Systems	X	X					X	
Sound Recognition			X	X			X	
User Models			X			X		

[1]Form of examinations:
A: assignments; **CA**: computer assignment; **DA**: design assignment; **IA**: implementation assignment; **IS**: internship; **RA**: research assignment; **PP**: paper; **RP**: research project; **WE**: written exam; **PR**: oral presentation

2. With the approval of the Board of Examiners, a student may also choose one or more of the following optional modules with a study load of 5 ECTS unless otherwise stated (for form of examination refer to the Teaching and Exam regulations of the appropriate Degree Programmes):

- Advanced Experimental Skills
- Advanced Self-organisation of Social Systems
- Cognitive Psychology (Psychology)
- Computational Semantics
- Computational Simulations of Language Behaviour
- Computer-Mediated Communication
- Corpus Analysis
- Dutch Semantics and Language Acquisition (10 EC)
- Memory and Learning
- Natural Language Processing
- Philosophy of Mind II: Consciousness and Action
- Philosophy of Neuroscience
- Philosophy of Probability
- Philosophy of Science, Technology and Society: The Information Society
- Programming in C++ (part I, II and/or part III: together max. 8 ECTS; part I max. 2 ECTS)
- Psychophysiology and its applications
- Repeated Measures
- Scientific Visualization
- Semantic Web Technology
- User Interface Evaluation
- Web and Cloud Computing

Appendix V   Entry requirements and compulsory order of examinations (art. 3.2)

- Final Research project:
    - Formal models of cognition, *and*
    - Cognitive modeling – basic principles and methods, *and*
    - Multivariate Models **or** Repeated Measures, *and*
    - Research project (15 ECTS), *and*
    - at least 60 ECTS of the degree programme.
- Robotics:
    - Cognitive Robotics
- Handwriting Recognition:
    - Signals and Systems
- Multi Agent Systems:
    - Advanced Logic *or*
    - Automated Reasoning *or*
    - Logic 3 (Model, oneindigheid en paradox)

Appendix VI   Admission to the degree programme and different specializations (art. 4.1.1 + art. 4.2)

1. Students in possession of a Dutch or foreign certificate of higher education that indicates that they have the following knowledge and skills shall be admitted to the degree programme:
   - knowledge of and insight in the subject of Artificial Intelligence
   - knowledge of and insight in the subject of Cognitive Psychology or Cognitive Science
   - knowledge of and insight in the subject of Statistics and Research methods
   - practical skills in Programming

2. The holder of a certificate from the Bachelor's degree programme "Artificial Intelligence" of any university in the Netherlands is expected to have the knowledge and skills listed in Article 4.1.1 and is admitted to the degree programme on that basis.