

**UNIVERSITY OF AMSTERDAM**  
**FACULTY OF SCIENCE**  
**TEACHING AND EXAMINATION REGULATIONS**  
**PART B: programme-specific section**

**Academic year 2020 – 2021**

**MASTER'S PROGRAMME ARTIFICIAL INTELLIGENCE**

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## Chapter 1. General Provisions

### Article B-1.1 - Definitions

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### Article B-1.2 - Study programme information

1. The Master's programme Artificial Intelligence (AI), CROHO number 66981, is offered on a full-time basis and official language is English. This means that the Code of Conduct for Foreign Languages at the UvA applies for this programme (see Code of Conduct Governing Foreign Languages at the University of Amsterdam 2000 at the website: <https://www.uva.nl/en/about-the-uva/policy-and-regulations/rules-and-regulations/teaching/teaching.html>).
2. The programme consists of a two-year programme with a total study load of 120 EC.

### Article B-1.3 - Enrolment

The programme is offered starting in the first semester of the academic year (1 September).

## Chapter 2. Programme objectives and exit qualifications

### Article B-2.1 - Programme objectives

A student who has obtained the degree of Master in Artificial Intelligence will have extensive knowledge and understanding of Artificial Intelligence. The Master programme is designed according to the following objectives:

1. *Knowledge and understanding*, the student is able to formulate a research plan, able to judge the quality of his/her own work and the work of others, and is able to understand the key areas in Artificial Intelligence.
2. *Applying knowledge and understanding*, the student is able to solve complex problems and applies his/her knowledge and understanding of this in a scientific manner.
3. *Making judgements*, the student is able to formulate an opinion or judgement on the basis of possibly incomplete information.
4. *Communication*, the student can communicate information to audiences of specialists as well as non-experts.
5. *Learning skills*, the student is able to detect and adjust missing knowledge accordingly.

### Article B-2.2 - Exit qualifications

Anyone who has obtained a Master degree in AI:

1. has thorough knowledge of the current theories, methods and techniques in the field of Artificial Intelligence;
2. has specialized knowledge of at least one of the following Artificial Intelligence subfields:
  - Machine Learning
  - Computer Vision
  - Deep Learning
  - Natural Language Processing
  - Fairness, Accountability, Confidentiality and Transparency in AI

- Information Retrieval
  - Knowledge Representation and Reasoning
3. has the capability to apply this knowledge to analyse, design and develop AI-systems;
  4. can formulate scientific questions and is able to solve problems with the aid of abstraction and modelling;
  5. is able to contribute to further developments of the theories, methods and techniques of AI in a scientific context;
  6. is able to express him/herself clearly on a technical/mathematical and general level;
  7. is aware of the social context and consequences of conducting AI research and work;
  8. can obtain an academic position at a university or research centre or scientific/applied position in the industry.

### **Chapter 3. Further admission requirements**

#### *Article B-3.1 - Admission requirements*

1. Admission to the Master's Programme in Artificial Intelligence is possible for students with one of the following qualifications:
  1. A Dutch Bachelor degree in 'Artificial Intelligence' or 'Computer Science';
  2. A Bachelor degree from the University of Amsterdam of the 'Bèta-Gamma' or 'Future Planet Studies' programme with a major in 'Artificial Intelligence';
  3. A Dutch or foreign qualification comparable to the one described in paragraph B-3.1.1., complemented by a necessary basic knowledge of Computer Science (at least 12 EC), basic programming skills (at least 12 EC), basic university level Calculus (at least 6 EC), basic university level Linear Algebra (at least 6 EC), basic university level Probability and Statistics (at least 6 EC) and a motivation which matches the content of the Master's programme. We require formal academic EC from a higher education institution, no online courses, work experience etc.
  4. In addition to these basic requirements we will instate the additional requirements as described in article B-3.3.
2. In addition to the requirements referred to in paragraph 1, the student has to comply with the following requirements:
  - a. The Bachelor's Grade Point Average (GPA) is at least 6.5 (according to the Dutch grading system). The GPA is the average of the Bachelor's course grades weighted by course/study load.
  - b. The student has obtained the Bachelor's degree within at most 3 year more than the nominal duration of the programme.
3. Without prejudice to the provisions of paragraph 1 the Admissions Board may grant admission to the programme when concluding that the previous education of the candidate is equivalent to the Bachelor's degrees referred to in paragraph 3.1.1. The Admissions Board decides in such cases for every student whether the previous education of the candidate had deficiencies for admission.
4. When the programme commences, the candidate must have fully completed the Bachelor's programme, allowing admission to this Master's programme.

#### *Article B-3.2 - Pre-Master's programme*

Not applicable.

#### *Article B-3.3 - Limited programme capacity*

1. The Dean has announced the maximum programme's capacity. Up to, but no more than, 180 students are admitted to the Master's programme Artificial Intelligence as a whole.
2. Candidates will be selected in the following way. First, candidates will have to meet the (additional) requirements as stated in paragraph 3.1. Subsequently all the candidates eligible for admission to the programme will be ranked by the ranking criteria as stated in paragraph 3.3.3.
3. Selection will be based on the following ranking criteria:
  - a. GPA score
  - b. Relevant AI projects (completed)
  - c. Programming skills
  - d. Knowledge of logic
  - e. Knowledge of mathematics
  - f. Topic of Bachelor thesis
  - g. Motivation for contents Master's programme
  - h. Relevant AI courses at level of Master's programme
  - i. Publications

The ranking criteria apply to all candidates who have met the requirements stated in article 3.1.

4. The Admissions Board will judge requests for admission on criteria mentioned in article B-3.3 and select students on an individual basis and in comparison to the other applicants. These criteria will not be applied mechanically, but manually with careful consideration and judgement. For example, the value of the GPA may depend on a students' curriculum, publications may be more or less high ranked, etc.
5. The top 180 candidates on the ranking list will be admitted to the master's programme. The Admissions Board will grant admission to the selected candidates.

#### *Article B-3.4 - Final deadline for registration*

A request for admission to the Master's programme starting in September must be submitted to Studielink and the Faculty before May 1<sup>st</sup> in the case of EU/EEA/Swiss students, and before February 1<sup>st</sup> in the case of non-EU/EEA/Swiss students. Under exceptional circumstances, the Admissions Board may consider a request submitted after this closing date.

#### *Article B-3.5 - English language requirements*

1. The proficiency requirement in English as the language of instruction can be met by the successful completion of one of the following examinations:
  - a. IELTS: 7.0, at least 7.0 on each sub-score (listening/reading/writing/speaking);
  - b. TOEFL paper-based: 590, paper-delivered at least 24 on each sub-score;
  - c. TOEFL Internet-based test: 100, at least 24 on each sub-score (listening/reading/writing/speaking);

The foregoing examination must have been taken within two years before the student's enrolment.

- d. C1 Advanced (CAE): minimal result 180 (overall B);
- e. C2 Proficiency (CPE): minimal result 170 (overall C).

Please note that the TOEFL-code for the University of Amsterdam is 9011.

2. An exemption from the English examination referred to in the first paragraph shall be granted to students who:
  - a. had previous education in secondary or tertiary education in one of the following English-speaking countries: Australia, Canada (English), New Zealand, Ireland, the United Kingdom or the United States of America;
  - b. hold an English-language 'international baccalaureate' diploma;
  - c. possess a Bachelor's degree from a Dutch university, which satisfies the requirement of sufficient command of the English language;

- d. passed the final examination for the subject of English as part of one of the following diplomas: VWO, Belgian ASO (Flemish).

## Chapter 4. Curriculum structure

### Article B-4.1 - Composition of programme

1. The programme consists of the following components:
  1. General compulsory components amounting to 90 EC, including the Master Thesis AI (48 EC);
  2. Restricted-choice elective components amounting to at least 18 EC;
  3. Free-choice elective components or additional restricted-choice elective components amounting to 12 EC.
2. A complete list of components provided by the Master's programme can be found in Appendix 1.
3. Every component will be tested. Within the Master's programme AI different types of testing are used. This is described per component in Appendix 1 and the course catalogue.
4. Within the Master's programme AI different types of teaching methods are used. This is described per component in Appendix 1 and the course catalogue.

### Article B-4.2 - Compulsory components

Within the AI programme, 42 EC worth of compulsory courses and the Master Thesis (48 EC) are obligatory. In addition, students choose at least 18 EC worth of courses from a restricted-choice elective courses list.

<b>Compulsory components (90 EC required)</b>					
<b>Component</b>	<b>Code</b>	<b>Study load (EC)</b>	<b>Period</b>	<b>Teaching method*</b>	<b>Assessment</b>
<b>Year 1 (42 EC required)</b>					
Computer Vision 1	52041COV6Y	6	1	L, PR, CP	Written
Deep Learning	5204DLFV6Y	6	2	L, CP	Written
Fairness, Accountability, Confidentiality and Transparency in AI	5204FACT6Y	6	3	L, PR, GP	Written
Information Retrieval 1	52041INR6Y	6	4	L, CP	Written
Knowledge Representation and Reasoning	5204KNRR6Y	6	6	L, PR, CP	Written
Machine Learning 1	52041MAL6Y	6	1	L, PR, CP	Written
Natural Language Processing 1	52041NLP6Y	6	2	L, CP	Written
<b>Year 2 (48 EC required)</b>					
Master Thesis AI	5204MTA48Y	48	2-6	IC	Written

\* L = Lectures, LS = Lab sessions, CP = Computer practical, PR = practical, IC = Individual coaching, GP = Group project

<b>Restricted-choice elective components (18 EC required)</b>					
<b>Component</b>	<b>Code</b>	<b>Study load (EC)</b>	<b>Period</b>	<b>Teaching method*</b>	<b>Assessment</b>
<b>Year 1</b>					
Advanced Topics in Computational Semantics	5314ATIC6Y	6	5	L, PR, CP	Written
Computational Dialogue Modelling	5314CODM6Y	6	5	L, PR	Written, oral
Computational Social Choice	5314COSC6Y	6	5	L, PR	Written

Computer Vision 2	52042COV6Y	6	5	L, CP	Written, oral
Game Theory	5314GATH6Y	6	4	L	Written
Information Visualization	5204INVI6Y	6	4	L, CP	Written, oral
Natural Language Processing 2	52042NLP6Y	6	4	L, CP	Written, oral
<b>Year 2</b>					
Deep Learning for Natural Language Processing	5204DLNL6Y	6	1	L, CP	Written, oral
Information Retrieval 2	52042INR6Y	6	1	L, CP	Written, oral
Information Theory	5314INTH6Y	6	2	L, PR	Written, oral
Machine Learning 2	52042MAL6Y	6	1	L, PR, CP	Written
Reinforcement Learning	5204RELE6Y	6	1	L, PR, CP	Written

\* L = Lectures, LS = Lab sessions, CP = Computer practical, PR = practical, IC = Individual coaching, GP = Group project

#### Article B-4.3 - Practical exercise

In addition to, or instead of, classes in the form of lectures, the elements of the Master's programme often include a practical component as defined in article A-1.2 of part A.

#### Article B-4.4 – Free-choice elective components

1. Students can choose up to 12 EC worth of free-choice elective components either from the AI programme or from other Master programmes.
2. For courses from other programmes, prior approval is needed from the Examinations Board.

<b>Suggested free-choice elective components</b>					
<b>Component</b>	<b>Code</b>	<b>Study load (EC)</b>	<b>Period</b>	<b>Teaching method*</b>	<b>Assessment</b>
<b>Year 1</b>					
Causality	5334CAUS6Y	6	4-5	L and/or PR	Written and/or oral
Data Mining Techniques (VU)	52848DAM6Y	6	5	L, PR, GP	Written
Data-Driven Business Innovation and Entrepreneurship	5294DDBI6Y	6	4	L, PR	Written
Knowledge Representation on the Web (VU)	5204KROT6Y	6	5	L, CP, GP	Written
Project Artificial Intelligence A**	5204PAIA6Y	6 - 12	1-6	IC	Written, oral
Project Artificial Intelligence B**	5204PAIB6Y	6	1-6	IC	Written, oral
<b>Year 2</b>					
Evolutionary Computing (VU)	52848EVC6Y	6	1	L	Written
Machine Learning Theory	5334MALT8Y	8	1-2	L	Written
Neural Dynamics and Deep Learning	5234NDDL6Y	6	2	L, PR	Assignments, essay, oral presentation

\* L = Lectures, LS = Lab sessions, CP = Computer practical, PR = practical, IC = Individual coaching, GP = Group project

\*\*See article B-4.11 for requirements regarding projects.

#### Article B-4.5 - Free curriculum

1. Subject to certain conditions, the student has the option of proposing a curriculum of his/her own choice which deviates from the curricula prescribed by the programme.
2. The details of such a curriculum must be approved beforehand by the Examinations Board of the master's programme.

3. The free curriculum is proposed by the student and:
  - a. must at least have the size, breadth and depth of a regular Master's programme;
  - b. must match the exit qualifications that apply for the Master's programme;
  - c. at least 60 EC must be obtained from the regular curriculum.

*Article B-4.6 - Sequence of examinations*

1. The student may start with the Master Thesis AI project if the personal study plan of the student has been approved by the Examinations Board. For this purpose, the student has to use the Study Plan Application (SPA) to submit the personal study plan for approval by the Examinations Board.
2. At the request of a student, the Examinations Board may deviate from the provisions of paragraph 1 for the benefit of this student.
3. The assessment of projects in which several students have worked on an assignment will only be made at the end of the relevant teaching period. In exceptional cases an individual student can be allowed to improve the result after the course is completed.
4. If a student feels that on account of exceptional circumstances the assessment, referred to in paragraph 3, is not a realistic assessment of his/her effort, knowledge, skills or insights, the student may request the Examinations Board to nevertheless permit an individual test and/or resit.

*Article B-4.7 - Participation in practical exercise and study group sessions*

Not applicable.

*Article B-4.8 – Maximum exemption*

A maximum of 18 EC in the programme can be accumulated through granted exemptions<sup>1</sup>.

*Article B-4.9 - Validity period of examinations*

The validity period of interim examinations and exemptions from interim examinations is limited, as described in part A, article A-4.8. The results of successfully completed examinations/components are tested after 5 years on grounds of present-day scientific insights. If the acquired knowledge no longer corresponds to the present-day scientific insights and the objectives of the master programme the Examinations Board can decide that the result of a successfully completed examination has expired and therefore the validity period of the course in question has to be limited.

*Article B-4.10 - Degree*

Students who have successfully completed their Master's examination are awarded a Master of Science degree. The degree awarded is stated on the diploma.

*Article B-4.11 - Internship/project*

1. 6 or 12 EC of the restricted-choice elective components and/or free-choice elective components may be used for an external internship or one or two individual projects (known as Project Artificial Intelligence A and Project Artificial Intelligence B). A student can include at most 12 EC in the student's study plan for these internships/projects.
2. The prior approval of the Examinations Board is required for an internship/project to be included in the student's study programme. To obtain approval for an internship/project the student will prepare a proposal that includes a description including the aim and content of the internship/project, a description of the work that will be done, a planning and the intended deliverable for assessment. The student finds a supervisor for the internship/project among the staff affiliated with the Master programme.

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<sup>1</sup> See article B-7.2 – Transitional provisions

- Participation in a summer school may also be regarded as an external internship/project.

## Chapter 5. Academic student counseling

### *Article B-5.1 - Academic student counselling*

The academic student counselling for this programme consists of: A study adviser.

## Chapter 6. Teaching evaluation

### *Article B-6.1 - Teaching evaluation*

Teaching evaluation shall take place as follows:

- Course evaluations (of a large selection of courses);
- Curriculum evaluation of the degree programme;
- Oral discussion.

All evaluation reports are discussed within the Programme Committee (OC). The OC advises the programme director on the quality of the degree programme.

## Chapter 7. Transitional and final provisions

### *Article B-7.1 - Amendments and periodic review*

- Any amendment to the Education and Examination Regulations will be adopted by the dean after taking advice, and if necessary approval by the relevant Programme Committee. A copy of the advice will be sent to the authorised representative advisory body.
- An amendment to the Education and Examination Regulations requires the approval of the authorised representative advisory body as stated in the WHW.
- An amendment to the Education and Examination Regulations is only permitted to concern an academic year already in progress if this demonstrably does not damage the interests of students.

### *Article B-7.2 - Transitional provisions*

By way of departure from the Education and Examination Regulations currently in force, the following transitional provisions apply for students who started the programme under a previous set of Education and Examination Regulations:

#### **Transitional Provisions for students who started in 2013-2014 or earlier**

Old component	Replacement in 2014-2015	Remarks
Information Retrieval	Information Retrieval 1	New course is 6 EC, old 3 EC
Autonomous Agents	Autonomous Agents 1	
Intelligent Multimedia Systems	Computer Vision 1	
Machine Learning: Pattern Recognition	Machine Learning 1	
Machine Learning: Principles and Methods	Machine Learning 2	
Elements of Language Processing and Learning	Natural Language Processing 1	New course is 6 EC, old 3 EC

Project AI	-	Students who started in 2013-14 and did not yet complete this project will be given the opportunity to do a project by individual arrangement.
Advanced Information Retrieval	Information Retrieval 2	
Advanced Topics in Autonomous Agents	Autonomous Agents 2	
Computer Vision	Computer Vision 2	
Game Programming	Technology for Games	
Statistical Structure in Language Processing	Natural Language Processing 2	

#### Transitional Provisions for students who started in 2014-2015 or earlier

Old component	Replacement in 2015-2016	Remarks
Autonomous Agents 1	Multi-Agent Systems	
Autonomous Agents 2	-	No replacing course available, other course in consultation with programme director and Examinations Board

#### Transitional Provisions for students who started in 2017-2018 or earlier

Old component	Replacement in 2018/2019	Remarks
Applied Language Technology	Deep Learning for Natural Language Technology	
Computer Intelligence (VU)	Evolutionary Computing (VU)	
Unsupervised Language Learning	Machine Learning for Natural Language Processing	

#### Transitional Provisions for students who started in 2018-2019 or earlier

Old component	Replacement in 2019/2020	Remarks
Data Mining Techniques, Knowledge Representation on the Web Knowledge Engineering Seminar Combining Symbolic and Statistical Methods in AI	-	These (previously restricted-choice elective) courses have become suggested free-choice electives.
Deep Learning for Natural Language Technology	Deep Learning for Natural Language Processing	New name, same course
Evolutionary Computing (VU), Multi-Agent Systems (VU), Knowledge Representation (VU)	Have been replaced by other compulsory courses at the UvA. Students who started in 2018-2019 or earlier may choose either the old and/or new compulsory courses, as long as they have 42 EC of compulsory courses.	These (previously compulsory) courses have become suggested free-choice electives.

Master Thesis AI - 36 EC (5204MTA36Y)	Master Thesis AI – 48 EC (5204MTA48Y). Students who started in 2018-2019 or earlier may choose either the 36 or 48 EC variant, as long as students have 42 EC of compulsory components and at least 18 EC of restricted-choice elective components.	48 EC instead of 36 EC. Apart from being longer, the 48 EC variant includes an optional thesis coaching track.
Project AI, Project AI 2, Project AI 3	Project AI A, Project AI B	We no longer offer the team-based Project AI. Individual projects are still possible, they are renamed to Project AI A and Project AI B.
Probabilistic Robotics Technology for Games	-	No replacement course available, choose alternative restricted-choice elective or free-choice elective instead.

#### Transitional Provisions for students who started in 2019-2020 or earlier

Old component	Replacement in 2020/2021	Remarks
30 EC in the programme can be accumulated through granted exemptions.	18 EC in the programme can be accumulated through granted exemptions.	Students who started in 2019-2020 or earlier and have, before start of academic year 2020-2021, accumulated more than 18 EC through granted exemptions, are allowed to maintain the granted exemptions with a maximum of 30 EC.
-	Causality	Not a replacement, but newly added suggested free-choice elective.
Knowledge Representation (VU)	None	This course is no longer a suggested free-choice elective.
Mathematics for Artificial Intelligence (self-study)	None	This course is no longer a suggested free-choice elective.
-	Neural Dynamics and Deep Learning	Not a replacement, but newly added suggested free-choice elective.
Seminar Combining Symbolic and Statistical Methods in AI	None	This course is no longer a suggested free-choice elective.
Symbolic Systems 1	Knowledge Representation and Reasoning	New name, same course.

*Article B-7.3 - Publication*

1. The Dean of the faculty will ensure the appropriate publication of these Regulations and any amendments to them.
2. The Teaching and Examination Regulations will be posted on the faculty website and deemed to be included in the course catalogue.

*Article B-7.4 - Effective date*

These Regulations enter into force with effect from August 31<sup>st</sup>, 2020.

Thus drawn up by the Dean of the Faculty of Science on November 10<sup>th</sup>, 2020.