



Teaching and Examination Regulations

MASTER's Degree Programme

Parallel and Distributed Computer Systems

B. Programme-specific section

Academic year 2017-2018

Section B: Programme-specific section

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Section B: Programme-specific section

1. General provisions

Article 1.1 Definitions

Not applicable

Article 1.2 Degree programme information

1. The programme in Parallel and Distributed Computer Systems (CROHO number 60802) is a full-time programme taught in English.
2. The programme consists of 120 credits.
3. A unit of study comprises 6 EC or a multiple thereof. The units of study listed below have a different size:

Course code	Course component	EC
XM_400426	Selected Topics in PDCS	3

Article 1.3 Intake dates

The programme is offered starting in the first semester of the academic year only (1 September). The intake date(s) mentioned in this paragraph ensure(s) that a programme can be completed within the nominal study duration set for the programme.

2. Programme objectives and exit qualifications

Article 2.1 Programme objective

The Master's programme in Parallel and Distributed Computer Systems focuses on acquiring knowledge of the concepts, methods and skills that are relevant to the operation and implementation of computer systems, including topics such as programming, enterprise systems, computer networks, data structures, performance analysis, the theoretical foundations of communication systems and system security.

Internet-based services, high-performance computing and peer-to-peer systems are at the very core of Parallel and Distributed Computer Systems. Students who wish to take the Master's programme in Parallel and Distributed Computer Systems should have a solid foundation in the field of computer science at Bachelor's level, particularly in the area of computer systems.

Article 2.2 Exit qualifications

A graduate of the degree programme Parallel and Distributed Computer Systems is expected to:

- have solid scientific knowledge and understanding of Parallel and Distributed Computer Systems, including knowledge of computer systems, programming, operating systems, computer networks, data structures, the theoretical foundations of communication systems and security systems, all of which transcend Bachelor's level;
- be capable of acquiring knowledge, understanding and skills in other sub-areas of computer science within a reasonable period;
- have acquired practical skills in relevant areas of computer science at an academic level;
- be aware of the applications of computer science in general and of Parallel and Distributed Computer Systems in particular, and be capable of applying their knowledge and skills to new and unfamiliar problems;
- be capable of designing a research plan or project on the basis of a realistic problem description from the field of computer science;
- be capable of conducting scientific research, both independently and as a member of a small team;
- be capable of consulting international professional literature on relevant areas of computer science and of using the discussions and results found there;
- be capable of formulating, analysing and evaluating scientific results, and of using them to draw relevant conclusions;

- be capable of performing effectively in professional situations where scientific knowledge and skills in the field of computer science are required;
- have developed a critical scientific attitude and an awareness of the social aspects of information technology;
- be capable of communicating at a professional level and of giving clear oral and written presentations of their own work or others' work;
- be thoroughly prepared for an academic programme at PhD level and/or other post-graduate programmes as a professional computer scientist.

3. Further admission requirements

Article 3.1 Admission requirements

1. Students will be admitted to the degree programme if they hold a letter of acceptance, issued by or on behalf of the Faculty Board because they have demonstrated that they meet the knowledge, understanding and skills requirements reflecting the final level of attainment in an academic Bachelor's degree programme.
2. The Examination Board will assess each individual application for admission with regard to the admission requirements.
3. In addition to the requirements mentioned in the first paragraph, the Examination Board will also assess applications for admission based on the following criteria:
 - a. talent and motivation;
 - b. command of methods and techniques.
4. If the Master's programme consists of various programmes, then a prerequisite may be set for each programme consisting of a completed Bachelor's specialization or minor.
5. Those not yet in possession of a Bachelor's degree, but who meet the admission requirements as regards the knowledge, insight and skills specified in paragraph 1, may on request be granted conditional admission to the associated Master's programme, insofar as failure to grant admission would result in undue unfairness.

Article 3.2 Pre-Master's programme

There is no possibility to enrol in the Master's programme through a pre-master programme.

Article 3.3 Limited programme capacity

Not applicable

Article 3.4 Final deadline for registration

A candidate must submit a request to be admitted to the programme through Studielink before 1 June in the case of Dutch students, before 1 April in the case of EU students and before 1 February in the case of non-EU students. Under exceptional circumstances, the Examinations Board may consider a request submitted after this closing date.

Article 3.5 English language requirement for English-language Master's programmes

1. The proficiency requirement in English as the language of instruction can be met by the successful completion of one of the following examinations or an equivalent:
 - IELTS: 6.5
 - TOEFL paper based test: 580
 - TOEFL internet based test: 92-93
 - Cambridge Advanced English: A, B or C.
2. Exemption is granted from the examination in English referred to in the first paragraph to students who, within two years of the start of the programme:
 - met the requirements of the VU test in English language proficiency TOEFL ITP, with at least the scores specified in paragraph 1, or
 - had previous education in secondary or tertiary education in an English-speaking country as listed on the VU website, or
 - have an English-language 'international baccalaureate' diploma

Article 3.6 Free curriculum

1. Under certain conditions, students have the option of departing from the standard curriculum as prescribed by the programme Computer Science and composing their own study programme.
2. The composition of such a programme requires the prior approval of the Examination Board Computer Science that has the greatest jurisdiction over the programme components.
3. The free programme Computer Science is to be composed by the student from educational units offered by VU University Amsterdam, University of Amsterdam or another Dutch university, and is to comprise at least the same study load, depth and scope as a standard Master's programme.

4. Curriculum structure

Article 4.1 Composition of programme

1. The programme has a study load of 120 credits and consists of the following components:
 - a. required educational units
 - b. practical components
 - c. electives
2. Notwithstanding the provisions of paragraph 1, students may compose their own Master's programme under certain circumstances and with the prior approval of the Examination Board.

Article 4.2 Compulsory units of study

The compulsory units of study are:

	<u>Year 1</u>			
Course Code	Course Name	EC	Period	Level
X_400127	Computer and Network Security	6	1	500
X_400130	Distributed Systems	6	2	400
XM_40019	Secure Software	6	2	500
XM_40017	Programming Large-scale Parallel Systems	6	1	400

Year 2

Course Code	Course Name	EC	Period	Level
X_405022	Advanced Topics in Distributed Systems	6	1	600
X_405023	Research Proposal Writing	6	2	600
XM_400461	Master Project PDCS	36	Ac. Year	600

Article 4.3 [Practical exercise](#)

The practical exercises are listed in Article 4.2. Required educational units marked as practical exercise (prac).

Article 4.4 [Electives](#)

The student can take of the following electives:

Foundations of Computing and Concurrency (6 EC required)

Course Code	Course Name	EC	Period	Level
X_400115	Logical Verification	6		500
X_400117	Protocol Validation	6	1	500
X_400211	Distributed Algorithms	6	5	500
X_405041	Coding and Cryptography	6	4	500
X_405064	Concurrency and Multithreading	6	2	400

Constrained Choice Programming (6EC)

Course Code	Course Name	EC	Period	Level
X_400162	Parallel Programming Practical	6	2+3	500
XM_40011	Android Lab	6	5+6	400
XM_40014	Kernel Programming	6	1	400
XM_405054	PDCS Programming Project	12	Ac. Year	600

Optional Courses

Course Code	Course Name	EC	Period	Level
X_400111	Evolutionary Computing	6	1	400
X_405048	Advanced Logic	6	4	500
X_405082	Internet programming	6	1	400
X_405100	Binary and Malware Analysis	6	5	500
X_405105	Performance of Networked Systems	6	4	400
X_405116	Large Scale Data Engineering	6	1	500
X_418158	Green Lab	6	1	400
XM_40020	Web Data Processing Systems	6	2	400
XM_400121	Term Rewriting Systems	6	5	400
XM_400379	Selected Topics in PDCS	6	Ac. Year	500
XM_400426	Selected Topics in PDCS	3	Ac. Year	500
XM_405080	Industrial Internship	6	Ac. Year	400
XMU_40015	Parallel System Architectures	6	1	400
XMU_40016	Performance Engineering	6	5	500
XMU_40018	Programming Multi-core and Many-core Sysg	6	4	400

If the student wishes to take a different course than the units of study listed, advance permission must be obtained in writing from the Examinations Board.

Article 4.5 Sequence of examinations

The study guide details those examinations and/or practical exercises that may only be taken once the exams of other (prior) components have been passed.

Article 4.6 Participation in practical exercise and tutorials

1. Students are expected to participate actively in all degree components for which they are registered.
2. In addition to the general requirement regarding active participation, the study guide details additional requirements for each degree component, as well as component attendance requirements.
3. At the start of each degree component, a specification will be made available which details:
 1. The final attainment levels of the degree component;
 2. The study guidelines for passing the degree component;
 3. The way in which the final attainment levels are assessed;
 4. The regulations for examinations and resits;
 5. The guidance provided by lecturers during scheduled hours and otherwise;
 6. Component attendance requirements;
 7. The provision of feedback to the student on assignments and reports submitted, and presentations given during the degree component.
4. If a student is prevented by force majeure from attending a required degree component, then the student must send written notification of his or her absence to the examiner and the master coordinator as soon as possible. The examiner may, after consultation with the master coordinator, give the student an alternative assignment.
5. Absence from degree components with required attendance is only allowed in the case of force majeure.
6. In the event of inadequate participation, either qualitative or quantitative, the examiner may exclude the student from further participation in the degree component or a part of the degree component. The details of the student's inadequate participation must be recorded in advance and approved by Programme Director.
7. Notwithstanding the provisions of Article 4.5 of Part A of the Academic and Examination Regulations, there is no resit for a computer practical.

Article 4.7 Maximum exemption

A maximum of 60 EC of the curriculum can be accumulated through granted exemptions.

Article 4.8 Validity period for results

No further specific provisions to article 4.8 of TER part A.

Article 4.9 Degree

Students who have successfully completed their Master's final examination are awarded a Master of Science degree. The degree awarded is stated on the diploma. If it is a joint degree, this will also be stated on the diploma.

5. Transitional and final provisions

Article 5.1 Amendments and periodic review

1. Any amendment to the Teaching and Examination Regulations will be adopted by the faculty board after taking advice, and if necessary approval by the Programme Committee concerned. A copy of the advice will be sent to the authorized representative advisory body.
2. An amendment to the Teaching and Examination Regulations requires the approval of the authorized representative advisory body if it concerns components not related to the subjects of Section 7.13, paragraph 2 sub a to g and v of the WHW and the requirements for admission to the Master's programme.
3. An amendment to the Teaching and Examination Regulations can only pertain to an academic year that is already in progress if this does not demonstrably damage the interests of students.

Article 5.2 Transitional provisions

Notwithstanding the current Teaching and Examination Regulations, the following transitional provisions apply for students who started the programme under a previous set of Teaching and Examination Regulations:

Article 5.3 Publication

1. The faculty board will ensure the appropriate publication of these Regulations and any amendments to them.
2. The Teaching and Examination Regulations will be posted on VUnet.

Article 5.4 Effective date

These Regulations enter into force with effect from 1 September 2017.

Advice from Programme Committee, on 20 April 2017.

Advice from Examination Board of the Faculty of Science, on 10 November 2016

Approved by authorized representative advisory body, on 6 July 2017

Adopted by the Board of the Faculty of Science, on 21 July 2017.

Appendix I

List of articles that must be included in the OER pursuant to the WHW (articles in framed boxes):

Section A

Art. 1.1	7.13, para 1, WHW
Art. 2.1	7.13, para 2 sub w
Art. 3.2	7.13, para 2 sub e
Art. 4.2	7.13, para 2 sub h and l
Art. 4.3	7.13, para 2 sub n
Art. 4.4	7.13, para 2 sub o
Art. 4.5	7.13, para 2 sub j, h
Art. 4.7	7.13, para 2 sub r
Art. 4.8	7.13, para 2 sub k
Art. 4.9	7.13, para 2 sub p
Art. 4.10	7.13, para 2 sub q
Art. 4.11	7.13, para 2 sub a
Art. 5.1	7.13, para 2 sub u
Art. 5.2	7.13, para 2 sub m

Section B

Art. 1.2	7.13, para 2 sub i
Art. 2.1	7.13, para 1 sub b, c
Art. 2.2	7.13, para 2 sub c
Art. 3.1	7.25, para 4
Art. 4.1	7.13, para 2 sub a
Art. 4.2	7.13, para 2 sub e, h, j, l
Art. 4.3	7.13, para 2 sub t
Art. 4.4	7.13, para 2 sub e, h, j, l
Art. 4.5	7.13, para 2 sub s
Art. 4.6	7.13, para 2 sub d
Art. 4.8	7.13, para 2 sub k