

Teaching and Examination Regulations

Master programme in Parallel and Distributed Computer Systems

Faculty of Science

Academic year 2018-2019

B1. programme specific section - general provisions

B2. programme specific section – content of programme

Section B1: Programme specific – general provisions

6. General programme information and characteristics

Article 6.1 Study programme information

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| 1. The programme Parallel and Distributed Computer Systems CROHO number 60802 is offered on a full-time basis. | Advice OLC; approval FGV (7.13 i) |
| 1d The language of instruction is English | Advice OLC; approval FGV (9.38 b) |
| 2. A unit of study comprises 6 EC or a multiple thereof. The units listed below have a different size: Not Applicable | |

Article 6.2 Teaching formats used and modes of assessment

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| 1. The programme uses the teaching formats as specified in the Study Guide. | Advice OLC; approval FGV (7.13 x) |
| 2. The modes of assessment used per educational component are specified in the Study Guide. | Advice OLC; approval FGV (7.13 l) |

7. Further admission requirements

Article 7.1 Intake date(s)

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| 1. The programme starts on September 1. | Advice OLC; approval FGV (9.38 b) |
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Article 7.2 Admission requirements

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| <p>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.</p> <p>2. 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.</p> <p>3. 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.</p> | Partly legal provision & ordinance CvB, see appendix 3. Admission requirements excepted from participation in WHW |
| 4. The Admissions Board will investigate whether the applicant meets the admission requirements. | Legal provision |

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| <p>5. In addition to the requirements referred to in the first paragraph, the Admissions Board can also assess requests for admission in terms of (at least two of) the following criteria:</p> <ol style="list-style-type: none"> talent and motivation; level of relevant knowledge and understanding; proficiency in methods and techniques; academic attitude and critical thinking; proficiency in the language(s) of instruction | <p>Partly legal provision & ordinance CvB, see appendix 3. Admission requirements excepted from participation in WHW</p> |
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Article 7.3 English language requirement for English-language Master's programmes

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| <p>1. The proficiency requirement in English as the language of instruction can be met if no longer than two years before the start of the programme, the applicant has successfully completed one of the following examinations with at least the scores indicated:</p> <ul style="list-style-type: none"> - IELTS: 6.5 - TOEFL paper based test: 580 - TOEFL internet based test: 92 - Cambridge Advanced English: A, B or C. | <p>Landelijke gedragscode Internationale studenten</p> |
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Article 7.4 Pre-Master's programme

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| <p>1. Students with a Bachelor's degree in a field that corresponds to a sufficient extent with the subject area covered by the Master's programme can request admission to the pre-Master's programme.</p> | <p>advies OLC; instemming FGV (9.38 b)</p> |
| <p>2. A successfully completed pre-Master's programme serves as proof of admission to the specified Master's programme in the subsequent academic year.</p> | <p>advies OLC; instemming FGV (9.38 b)</p> |

8. Interim examinations and results

Article 8.1 Sequence of interim examinations

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| <p>1. Students may participate in interim examinations [or practical exercises] of the components below only if they have passed the interim examination or examinations for the components mentioned hereinafter:</p> | <p>Advice OLC; approval FGV (7.13 h, s & t)</p> |
| <p>Not Applicable.</p> | |

Article 8.2 Validity period for results

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| <p>1. The validity period of the interim examinations and exemptions from interim examinations below, is limited as follows: Not Applicable.</p> | <p>Advice OLC; approval FGV (7.13 k)</p> |
| <p>2. A student may request the Examination Board to extend the validity of an exam. If the exam shows that a student's knowledge is insufficient or outdated, or if the student's skills and insights evaluated in the exam are demonstrably outdated, the Examination Board may impose a supplementary examination, impose a replacement examination or refuse to extend the period of validity.</p> | <p>Legal provision</p> |
| <p>3. In situations where a limited period of validity applies, the period of validity of</p> | <p>Legal provision</p> |

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| examinations may be extended in the event of extenuating circumstances as stipulated in WHW Article 7.51, paragraph 2, with at least the period of allocated financial assistance specified in WHW Article 7.15, paragraph 1. | |
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Article 8.3. Degree

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| 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.. | Legal provision |
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Section B2: Programme specific – content of programme

9. Programme objectives, specializations and exit qualifications

Article 9.1 Workload

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| 1. The programme has a workload of 120 EC. | Advice OLC; (7.13 a) |
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Article 9.2 Specializations

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| The programme has the following specializations: Not Applicable | Advice OLC; (7.13 a) |
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Article 9.3 Programme objective

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| <p>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.</p> <p>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.</p> | Advice OLC; (7.13 a) |
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Article 9.4 Exit qualifications

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|---|----------------------------------|
| <p>1. At all events, a graduate of the study programme will:</p> <ul style="list-style-type: none"> • 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. | <p>Approval OLC (7.13 c)</p> |
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10. Curriculum structure

Article 10.1 Composition of the programme

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| <p>1. The programme comprises at least a package of compulsory components and an individual Master's thesis or academic internship.</p> | <p>Ordinance CvB, see appendix 3</p> |
| <p>2. Additionally the programme can offer:</p> <ul style="list-style-type: none"> - Practical exercises - Electives | <p>Advice OLC; (7.13 a)</p> |
| <p>3. Educational components are categorized as specialized (400), research oriented (500) and highly specialized (600) level.</p> | <p>Ordinance CvB, see appendix 3</p> |

Article 10.2 Compulsory educational components

A detailed description per educational component can be found in the Study Guide.

| Educational component | course code | nr of EC | level | Advice OLC; (7.13 a) |
|--|-------------|----------|-------|-------------------------|
| Year 1 | | | | |
| Computer and Network Security | X_400127 | 6 | 400 | |
| Distributed Systems | X_400130 | 6 | 400 | |
| Parallel Programming Practical | X_400162 | 6 | 500 | |
| Programming Large-scale Parallel Systems | XM_40017 | 6 | 400 | |
| Secure Software | XM_40019 | 6 | 500 | |
| Year 2 | | | | |
| Advanced Topics in Distributed Systems | X_405022 | 6 | 600 | |
| Research Proposal Writing | X_405023 | 6 | 600 | |
| Master Project PDCS | XM_0012 | 30 | 500 | |
| Master Project PDCS | XM_400461 | 36 | 600 | |
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[Optional] Article 10.3 Elective educational components

| 1. The student can take one or more of the following electives without prior consent from the Examination Board: | | | | Advice OLC; (7.13 a) |
|--|-------------|----------|-------|-------------------------|
| Name of educational component | course code | nr of EC | level | |
| <i>Constrained choice FCC (6EC)</i> | | | | |
| Logical Verification | X_400115 | 6 | 500 | |
| Protocol Validation | X_400117 | 6 | 500 | |
| Distributed Algorithms | X_400211 | 6 | 500 | |
| Coding and Cryptography | X_405041 | 6 | 500 | |
| Advanced Logic | X_405048 | 6 | 500 | |
| Concurrency and Multithreading | X_405064 | 6 | 400 | |
| Term Rewriting Systems | XM_400121 | 6 | 400 | |
| <i>Constrained Choice Programming (6EC)</i> | | | | |
| Parallel Programming Practical | X_400162 | 6 | 500 | |
| Android Lab | XM_40011 | 6 | 400 | |
| Hardware Security | XM_40014 | 6 | 400 | |
| PDCS Programming Project | XM_405054 | 12 | 600 | |
| <i>Optional Courses</i> | | | | |
| Evolutionary Computing | X_400111 | 6 | 400 | |
| Internet programming | X_405082 | 6 | 400 | |
| Binary and Malware Analysis | X_405100 | 6 | 500 | |
| Performance of Networked Systems | X_405105 | 6 | 400 | |
| Large Scale Data Engineering | X_405116 | 6 | 500 | |
| Green Lab | X_418158 | 6 | 400 | |
| Web Data Processing Systems | XM_40020 | 6 | 400 | |

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|---|-----------|---|-----|-------------------------|
| Selected Topics in PDCS | XM_400379 | 6 | 500 | |
| Selected Topics in PDCS | XM_400426 | 3 | 500 | |
| Industrial Internship | XM_405080 | 6 | 400 | |
| Parallel System Architectures | XMU_40015 | 6 | 400 | |
| Performance Engineering | XMU_40016 | 6 | 500 | |
| Programming Multi-core and Many-core Sys | XMU_40018 | 6 | 400 | |
| | | | | |
| | | | | |
| 2. If the student wishes to take a different educational component than listed, advance permission must be obtained in writing from the Examinations Board. | | | | Advice OLC; (7.13 a) |

Article 10.4 Participation in practical exercise

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| <ol style="list-style-type: none"> 1. Student 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, including attendance requirements. 3. At the start of each degree component, a specification will be made available which details: <ul style="list-style-type: none"> - The final attainment levels of the degree component; - The study guidelines for passing the degree component; - The way in which the final attainment levels are assessed; - The regulations for examinations and resits; - The guidance provided by lecturers during scheduled hours and otherwise; - Component attendance requirements; - 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 study advisor as soon as possible. The examiner may, after consultation with the study advisor, 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 the Director of Studies. | Approval OLC (7.13 d) |
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11. Evaluation and transitional provisions

Article 11.1 Evaluation of the education

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| 1. The education provided in this programme is evaluated in accordance with the | Approval OLC (7.13 a1) |
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| (attached) evaluation plan. The faculty evaluation plan offers the framework. | |
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Article 11.2 Transitional provisions

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| By way of departure from the Teaching and Examination Regulations currently in force, the following transitional provisions apply for students who started the programme under a previous set of Teaching and Examination Regulations: Not Applicable | Advice OLC (7.13 a) |
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Advice and approval by the Programme Committee, on (date) February 12th 2018

Approved by the Faculty Joint Assembly, on (date) June 26th 2018

Adopted by the board of the Faculty of Science on June 26th 2018

Appendix I

Overview of articles that must be included in the OER

Based on Section 7.13, paragraph 2, of the WHW and other Sections of the Act.

Section A: Faculty section

| 2. Study programme structure | |
|---|------------------------------|
| Article 2.1 Structure of academic year and educational components | 7.13 paragraph 2 sub e |
| 3. Assessment and Examination | |
| Article 3.2 Type of examination | 7.13 paragraph 2 sub h, l, j |
| Article 3.3 Oral interim examinations | 7.13 paragraph 2 sub l, n |
| Article 3.4 Determining and announcing results | 7.13 paragraph 2 sub o |
| Article 3.5 Examination opportunities | 7.13 paragraph 2 sub h, j |
| Article 3.7 Exemption | 7.13 paragraph 2 sub r |
| Article 3.8 Validity period for results | 7.13 paragraph 2 sub k |
| Article 3.9 Right of inspection and post-examination discussion | 7.13 paragraph 2 sub p, q |
| 4. Academic student counselling and study progress | |
| Article 4.1 Administration of study progress and academic student counselling | 7.13 paragraph 2 sub u |
| Article 4.2 Adaptations for students with a disability | 7.13 paragraph 2 sub m |

Section B1: Programme specific – general provisions

| 6. General programme information and characteristics | |
|---|------------------------------|
| Article 6.1 Study programme information | 7.13 paragraph 2 sub i, r |
| Article 6.2 Teaching formats used and modes of assessment | 7.13 paragraph 2 sub l, x |
| [option:] Article 6.3 Academic student counselling | 7.13 paragraph 2 sub u |
| 7. Further admission requirements | |
| Article 7.2 Admission requirements | 7.30b paragraph 2 |
| 8. Interim examinations and results | |
| Article 8.1 Sequence of interim examinations | 7.13 paragraph 2 sub h, s, t |
| [option 1:] Article 8.2 Validity period for results | 7.13 paragraph 2 sub k |
| [option 2:] Article 8.2 Validity period for results | 7.13 paragraph 2 sub k |

Section B2: Programme specific – content of programme

| 9. Programme objectives, specializations and exit qualifications | |
|--|---------------------------|
| Article 9.1 Workload | 7.13 paragraph 2 sub g |
| Article 9.2 Specializations | 7.13 paragraph 2 sub a |
| Article 9.3 Programme objective | 7.13 paragraph 2 sub a |
| Article 9.4 Exit qualifications | 7.13 paragraph 2 sub b, c |
| 10. Curriculum structure | |
| Article 10.1 Composition of the programme | 7.13 paragraph 2 sub a |
| Article 10.2 Compulsory educational components | 7.13 paragraph 2 sub a |
| [Optional] Article 10.3 Elective educational components | 7.13 paragraph 2 sub a |
| [Optional] Article 10.4 Practical exercise | 7.13 paragraph 2 sub d |
| Article 10.5 Participation in practical exercise | 7.13 paragraph 2 sub d |
| 11. Evaluation and transitional provisions | |
| Article 11.1 Evaluation of the education | 7.13 paragraph 2 sub a1 |
| Article 11.2 Transitional provisions | 7.13 paragraph 2 sub a |

Appendix II

Table of right of advice and right of approval by the OLC and FGV

(translation to English at a later stage)

| Onderwerpen Onderwijs – en Examenregeling (OER) 7.13 paragraph 2 WHW | FGV | | OpIC | |
|---|-----|---|------|---|
| | I | A | I | A |
| | | | | |

| | | | | |
|---|--|--|--|--|
| a. de inhoud van de opleiding en van de daaraan verbonden examens | | | | |
| a1. de wijze waarop het onderwijs in de desbetreffende opleiding wordt geëvalueerd | | | | |
| b. de inhoud van de afstudeerrichtingen binnen een opleiding | | | | |
| c. de kwaliteiten op het gebied van kennis, inzicht en vaardigheden die een student zich bij beëindiging van de opleiding moet hebben verworven | | | | |
| d. waar nodig, de inrichting van praktische oefeningen | | | | |
| e. de studielast van de opleiding en van elk van de daarvan deel uitmakende onderwijseenheden | | | | |
| f. de nadere regels, bedoeld in de Articleen 7.8b, zesde paragraaf, en 7.9, vijfde paragraaf (BSA) | | | | |
| g. ten aanzien van welke masteropleidingen toepassing is gegeven aan Article 7.4a, achtste paragraaf (verhoogde studielast) | | | | |
| h. het aantal en de volgtijdelijkheid van de tentamens alsmede de momenten waarop deze afgelegd kunnen worden | | | | |
| i. de voltijdse, deeltijdse of duale inrichting van de opleiding | | | | |
| j. waar nodig, de volgorde waarin, de tijdvakken waarbinnen en het aantal malen per studiejaar dat de gelegenheid wordt geboden tot het afleggen van de tentamens en examens | | | | |
| k. waar nodig, de geldigheidsduur van met goed gevolg afgelegde tentamens, behoudens de bevoegdheid van de examencommissie die geldigheidsduur te verlengen | | | | |
| l. of de tentamens mondeling, schriftelijk of op een andere wijze worden afgelegd, behoudens de bevoegdheid van de examencommissie in bijzondere gevallen anders te bepalen | | | | |
| m. de wijze waarop studenten met een handicap of chronische ziekte redelijkerwijs in de gelegenheid worden gesteld de tentamens af te leggen | | | | |
| n. de openbaarheid van mondeling af te nemen tentamens, behoudens de bevoegdheid van de examencommissie in bijzondere gevallen anders te bepalen | | | | |
| o. de termijn waarbinnen de uitslag van een tentamen bekend wordt gemaakt alsmede of en op welke wijze van deze termijn kan worden afgeweken | | | | |
| p. de wijze waarop en de termijn gedurende welke degene die een schriftelijk tentamen heeft afgelegd, inzage verkrijgt in zijn beoordeelde werk | | | | |
| q. de wijze waarop en de termijn gedurende welke kennis genomen kan worden van vragen en opdrachten, gesteld of gegeven in het kader van een schriftelijk afgenomen tentamen en van de normen aan de hand waarvan de beoordeling heeft plaatsgevonden | | | | |
| r. de gronden waarop de examencommissie voor eerder met goed gevolg afgelegde tentamens of examens in het hoger onderwijs, dan wel voor buiten het hoger onderwijs opgedane kennis of vaardigheden, vrijstelling kan verlenen van het afleggen van een of meer tentamens | | | | |
| s. waar nodig, dat het met goed gevolg afgelegd hebben van tentamens voorwaarde is voor de toelating tot het afleggen van andere tentamens | | | | |
| t. waar nodig, de verplichting tot het deelnemen aan praktische oefeningen met het oog op de toelating tot het afleggen van het desbetreffende tentamen, behoudens de bevoegdheid van de examencommissie vrijstelling van die verplichting te verlenen, al dan niet onder oplegging van vervangende eisen | | | | |
| u. de bewaking van studievoortgang en de individuele studiebegeleiding | | | | |
| v. indien van toepassing: de wijze waarop de selectie van studenten voor een speciaal traject binnen een opleiding, bedoeld in Article 7.9b, plaatsvindt (<i>excellentietaject binnen een opleiding</i>) | | | | |
| x. de feitelijke vormgeving van het onderwijs | | | | |
| <i>alle overige onderwerpen die in de OER zijn geregeld maar die niet als zodanig zijn genoemd in art. 7.13 WHW onder a t/m x.</i> | | | | |

De lettering komt overeen met de lettering van Article 7.13 paragraaf 2 WHW

Appendix III

Ordinances VU CvB and Binding Guidelines (richtlijn)

| Section A, article: | Concerns: | CvB ordinance / guideline |
|---------------------|--|--|
| 2.1.1, 2.1.2 | Year planning two semesters 8-8-4 (uniforme jaarkalender VU-UvA) | 29-9-2008 (periode 2009-2015) 22-05-2014 (periode 2016-2025) |

| | | |
|-----------------------------|--|--|
| 2.1.3, 2.1.4 | Educational components | Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 |
| 3.1 | Compulsory signing up | CvB ordinance 30-09-2010, prior consent USR. |
| 3.4.1 | Determination and publication of the results (1) Grading deadline exams 10 workdays (2) Theses 20 workdays | (1) Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 (2) Quality demand 11 from the VU assessment policy, CvB ordinance 15-05-2012 |
| 3.5.1 | Two possibilities to take examinations per year | Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 |
| 3.5.2 | Retake: most recent grade is valid. A pass can be retaken | Taken from the UvA guidelines, as part of the harmonization, CvB ordinance 24-02-2014 |
| 3.5.4 | Extra retake last year | Included in (prior) model OER 16-17 following a request from committee O&O and adopted by CvB op 27-10-2015 |
| 3.6 | Grades | CvB ordinance 30-09-2010, with University council's consent. As a result of harmonization UvA, the guideline: 5.5 is a pass, has been added. CvB ordinance 24-02-2014. |
| Section B1, article: | Concerns: | CvB ordinance / guideline |
| 7.2.1 | Admission criteria; at least WO Bachelor's degree | Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 |
| 7.2.3 | Additional admission criteria; type of criteria | Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 |
| Section B1, article: | Concerns: | CvB ordinance / guideline |
| 10.1 | Composition programme | Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 |
| 10.2 | Categorization of components | Richtlijn Bachelor en Masteronderwijs, revised on 6 June 2017 |