

**Master  
Computing  
Science**

This EER consists of various parts:

PART I: General provisions

Part II: Provisions applicable to all Master's programmes

Part III: Programme specific provisions

Appendices (2x)

Part I and II have a combined table of contents

Part III has a separate table of contents

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## **PART I General provisions**

### **Section 1 – General provisions**

#### ***Article 1.1 – Applicability of these regulations***

1. These Education and Examination Regulations (EER) apply to the Master's degree programmes of the Faculty of Science and outline the applicable procedures, rights and obligations concerning teaching, interim examinations and course examinations. Part II of these EER lists the provisions applicable to all Master's degree programmes of the Faculty of Science; Part III specifies the provisions applicable to each individual degree programme.
2. The present regulations apply to all students enrolled in a Faculty of Science degree programme for the first time in the academic year 2016-2017.
3. The faculty offers the following 120-EC Master's programmes:
  - a. Biology;
  - b. Computing Science;
  - c. Medical Biology;
  - d. Molecular Life Sciences;
  - e. Physics and Astronomy;
  - f. Science;
  - g. Chemistry;
  - h. Mathematics.

The faculty offers the following 60-EC Master's programmes:

- i. Information Sciences.
4. All degree programmes are offered exclusively as full-time programmes.

#### ***Article 1.2 – Definitions***

1. The terms used in these EER, which are also used in the Higher Education and Research Act (Wet op het hoger onderwijs en wetenschappelijk onderzoek, hereinafter, "the Act") will have the same meaning as in the Act.
2. Apart from the terms referred to in paragraph 1, the following terms will be understood to have the following meaning:
  - a. Fraud: any deliberate act or omission by a student that makes forming an accurate opinion of his or her knowledge, understanding and skills partially or entirely impossible.
  - b. Degree programme: the Master's degree programmes referred to in Article 7.3a, paragraph 1 of the Act;
  - c. Study component: an educational unit as referred to in Article 7.3, paragraph 3 of the Act;
  - d. Student: anyone enrolled at Radboud University for participation in a degree programme and/or in the courses or final examinations of a programme;
  - e. Practical exercise: a practical exercise as referred to in Art. 7.13 paragraph 2 under d of the Act, in one of the following forms:
    - i. Writing a thesis
    - ii. Writing a paper or experimental design
    - iii. Carrying out a design or research assignment

- iv. Completing a literature review
- v. Writing a computer program
- vi. Completing an internship
- vii. Participating in fieldwork or going on an excursion
- viii. Conducting tests or experiments
- ix. Participating in an additional educational activity to acquire certain skills;
- f. Interim examination: an examination testing the knowledge, understanding and skills of the student in relation to a certain unit of study, as well as the assessment of this examination, which is administered by at least one examiner designated by the Examination Board;
- g. Final examination: an examination of the student's academic achievements, in which the Examination Board determines whether or not all examinations that are part of the Master's programme have been successfully completed. The Examination Board may determine that this review requires a test of the candidate's knowledge, understanding and skills by the Examination Board itself and an assessment of the results of that test (in accordance with Article 7.10 of the Act);
- h. Examination Board: the examination committee of a degree programme, established in accordance with Article 7.12 of the Act. Also see the Radboud University Structural Regulations;
- i. Examiner: the person designated by the Examination Board to administer the interim examination, in accordance with Article 7.12 of the Act;
- j. EC: European Credits, i.e. the study load unit in accordance with the European Credit Transfer System. One EC is equal to 28 hours of study;
- k. Specialisation: a coherent programme within the Master's programme that has been approved as such by the faculty board;
- l. Work day: Monday till Friday, with the exception of official holidays and any other days marked by Radboud University as collective holidays;
- m. Awarding of the degree certificate: the formal confirmation that all the examination requirements have been met;
- n. Study guide: the guide for a particular degree programme of the Faculty of Science, containing specific information for the Master's degree programme;
- o. The University: Radboud University;
- p. The faculty: The Faculty of Science
- q. Free elective: a freely-selected, academic, testable component.

## **Part II Provisions applicable to all Master's programmes**

### **Section 2 Access to the degree programme and education**

#### ***Article 2.1 Admission and admission requirements***

1. Decisions regarding admission are made by the Examination Board.

2. The programme-specific part of this EER lists the admission requirements the student must meet to be admitted to the degree programme.

### **Section 3 Structure and design**

#### ***Article 3.1 Final examination, degree and distinctions***

1. The programme is concluded by the Master's examination.
2. A student who has passed the examination of the Master's degree programme will be awarded the Master of Science (MSc) degree.
3. The degree referred to in the second paragraph, is exclusively awarded if the student has earned at least half of his/her EC at this university.
4. The examination board can award a distinction to a student who has successfully passed the degree programme examination. The rules for awarding a distinction are to be found in Article 4.7 of this EER.

#### ***Article 3.2 General learning outcomes***

1. The degree programme has the following learning outcomes for students:
  - a. Acquire knowledge, skills and insights in the relevant field of study;
  - b. Develop academic competences;
  - c. Prepare for their future career;
  - d. Strengthen qualifications in the area of independent academic research;
  - e. With regard to the specialisation Science, Management and Innovation, acquire knowledge, insight and skills in relevant areas of business administration, policy sciences and social beta themes;
  - f. With regard to the specialisation Science in Society, acquire knowledge, insight and skill in relevant areas of media, knowledge transfer and social interaction;
  - g. With regard to the specialisation Science and Education, acquire additional teaching competences.

#### ***Article 3.3 Curriculum***

1. The programme comprises the total of the components as described in the programme-specific part of these regulations and is aimed at the realisation of well-defined objectives in the areas of the knowledge, understanding and skills that students are deemed to possess upon successful completion.
2. The programme has a number of research specialisations. These specialisations are described in Articles 7.1 and 7.5 of the programme specific provisions.
3. In addition, the faculty has 3 specialisations with a social component:
  - a. Science, Management and Innovation
  - b. Science in Society
  - c. Science and EducationThese specialisations are described in paragraphs 7, 8 and 9.
4. Within the Master's programme Computing Science, it is not possible to follow the specialisation referred to in paragraph 3 under c. (Science and Education).

5. Within the Master's programme Information Science, it is not possible to follow any of the specialisations referred to in paragraph 3.
6. The faculty specialisations mentioned in paragraph 3 consist of programme-specific components equivalent to 60 EC (see the programme-specific provisions in this EER) and account for 60 EC of the programme as described below in paragraphs 7, 8 and 9.

Each degree programme includes a component that is philosophical in nature with a minimum study load of 3 EC, free elective space of 6 EC and a portfolio component with a study load of 0 or 1 EC. For the specialisations Science, Management and Innovation and Science in Society, 3 EC of free electives space is included in the specialisation programme. The other 3 EC is included in the programme specific curriculum. For the specialisations Science, 6 EC of free electives space is included in the specialisation programme. The portfolio component is intended to enable students to reflect on study performance, planning and career orientation.

7. The specialisation Science, Management and Innovation includes the following components with the accompanying study load:
  - a. Courses selected by the student from the following themes: 1) climate and energy and 2) health. After permission from the Examination Board, a different social beta theme course may be selected as well. Depending on the theme, the student will follow compulsory courses from Science, Management and Innovation with a total study load of 12 EC, consisting of:
    - i. Core theme courses (6 EC);

Course code	Course name	EC
<i>Climate and Energy theme</i>		
NWI-FMT022	Climate and Energy	6
<i>Health theme</i>		
NWI-FMT023	The Future of Health: from the laboratory to the clinic and from utopia to applications	6

- ii. Courses on other themes (6 EC in total)
  - For the Climate and Energy theme, selection of

Course code	Course name	EC
NWI-FMT020	The Bio Economy	3
NWI-FMT026	Energy Modelling	3
NWI-MM020	Sustainable Consumption and Production	3

- For the Health theme, selection of:

Course code	Course name	EC
NWI-FMT021	Neuroscience	3
NWI-FMT025	Synthetic Bio-chemistry, Nanomedicine and Tissue Engineering: from research lab to clinic	3

For specific social beta themes a curriculum of specific themes has been set (12 EC)

- b. Compulsory Science, Management and Innovation components with a total study load of 15 EC:

Course code	Course name	EC
NWI-FMT003E	Innovation Management	6
NWI-FMT0234	Policy & Economics	3
NWI-FMT006A	Entrepreneurship Making a business plan	3
NWI-FMT019	Methods in Societal Research	3

- c. Free electives (3 EC) (part of the 6 EC free electives space of the Master's)  
 d. Science, Management and Innovation final research project of 30 EC
8. The specialisation Science, Management and Innovation includes the following components with the accompanying study load:
- a. Compulsory components with a total study load of 21 EC:

Course code	Course name	EC
NWI-FC002B	Science and Societal Interaction	3
NWI-FC003B	Risk Communication	3
NWI-FC0010C	Framing Knowledge	3
NWI-FC0011C	Knowledge Society	3
NWI-FC0013C	Science and Media	3
NWI-FC0043B	Science and Public Policy	3
NWI-FC0044B	Methods of Societal Research	3

- b. Electives within the specialisation with a total study load of at least 6 EC  
 c. Free electives (3 EC) (part of the 6 EC free electives space of the Master's)  
 d. Science in Society internship and report totalling 30 EC.
9. The specialisation Science and Education includes the following components with the accompanying study load:
- a. Series of lectures (5 EC)  
 b. Self-evaluation 1 (10 EC)  
 c. Supervised internship (15 EC)  
 d. Design and Research (10 EC)  
 e. Self-evaluation 2 (5 EC)  
 f. Independent internship (15 EC)

These components are provided by the Radboud Graduate School of Education. If, due to the successful completion of the education minor during the Bachelor's programme or for other reasons, a portion of the above-mentioned components need not be followed, the corresponding number of EC must be filled with programme specific components.

10. The composition of the Master's programme compiled by the student must be presented for



approval to the Examination Board no later than six months before the expected examination date. The Examination Board will decide whether to grant approval within a month of receiving the submitted programme.

#### *Article 3.4 Sequence of education and interim examinations*

1. The graduation project of the specialisation Science, Management and Innovation cannot be taken before a passing grade has been earned or an exemption granted for the core theme courses and the Methods in Societal Research courses, as referred to in Article 3.3 paragraph 7 under a and b.
2. The graduation project of the specialisation Science in Society cannot be taken before a passing grade has been earned or an exemption granted for a total of 12 EC of compulsory components, including the component Methods in Societal Research, as referred to in Article 3.3 paragraph 8 under a.
3. The components of the specialisation Science and Education cannot be taken before a passing grade has been earned or an exemption granted for the programme-specific components with a study load of at least 30 EC, including the practical activities of the research internship/research thesis of the degree programme.
4. If applicable, the programme-specific section lists additional requirements regarding the sequence of the programme-specific components of the specialisations with a social component and for the research specialisations.

#### *Article 3.5 – Type of interim examination*

1. Each component of the degree programme will be concluded by an interim examination. Interim examinations may comprise more than one modular interim examination and are administered in the following forms:
  - a. Written (paper and/or digitally);
  - b. Oral;
  - c. Presentation;
  - d. Practical and related report.
2. At the request of the student, the Examination Board may allow an interim examination to be administered in a form other than stated above.
3. Students with disabilities are given the opportunity to take interim examinations in a manner appropriately suited to their disability. The Examination Board, if necessary, shall seek expert advice and counsel prior to reaching its decision. If the students in question require certain facilities for their interim examinations, they must request these from the faculty's Education and Examination Administration no later than two weeks before the interim examination.
4. For oral examinations, no more than one person is tested at the same time, unless decided otherwise by the Examination Board.
5. An oral interim examination is not public, unless the Examination Board has deemed otherwise for exceptional cases.
6. Oral interim examinations are administered in the presence of at least one second examiner or an observer appointed by the Examination Board. In special cases, the Examination Board may require that the oral interim examination be recorded.

7. For each component, the examiner with the approval of the Examination Board will announce the form in which the interim examinations will be administered prior to the commencement of the academic year. In special cases, the examiner may change the format of examination later on in the academic year. This may only be done before the start of the component in question and must be approved by the Examination Board.

### ***Article 3.6 Exemptions***

1. The Examination Board at the request of a student and having heard the examiner involved, may exempt the student, either partially or fully, from sitting an interim examination if the student:
  - a. has passed a course examination in a relevant subject at a university or institute of higher vocational education (HBO);
  - b. demonstrates that he/she has adequate knowledge and skills regarding the component in question as a result of relevant work experience or professional experience.
2. At the request of the student who has completed a Bachelor's at the faculty, granting access to the Master's, the Examination Board may grant the student exemption for a maximum of two Master's courses or for multiple Master's courses with a total study load of no more than 10 EC, provided these were earned as extracurricular Bachelor's components and correspond to the Master's components.
3. Exemptions as referred to in paragraphs 1 and 2 cannot be granted for final examination papers.

### ***Article 3.7 Term of validity of successfully completed interim examinations***

1. The term of validity of successfully completed interim examinations is unlimited.
2. Contrary to the provisions in the first paragraph, the Examination Board may set supplementary or replacement requirements for a component, if it judges that the requirements pertaining to that interim examination deviate considerably from those that were in effect at the time the interim examination was taken.

## **Section 4 Examinations**

### ***Article 4.1 Frequency of interim examinations***

1. Students are given at least two opportunities per year to take interim examinations, with the exception of practical courses or the practical portion of components, which can be taken at least once per academic year. Interim examinations are administered immediately upon completion of the component, during a period to be determined.
2. Contrary to the stipulation in the first paragraph, there will be at least one opportunity in the following year to take an interim examination for a course that was taught for the final time in a particular academic year.
3. If a certain component is not given in a particular year, the opportunity to take the corresponding examination will be given once in that year, as long as the interim examination is administered in written or oral form.

#### ***Article 4.2 Registration for interim examinations***

1. Students who register through OSIRIS for courses in the programme are also automatically registered for the first interim examination opportunity in the relevant academic year. If a student does not wish to participate in the interim examination, he/she must de-register for the examination via Osiris up to 1 day before the examination date. After the abovementioned time period, the student can only personally deregister directly with the lecturer up until the starting time of the interim examination.

If the student does not sit the examination without having deregistered in time, he/she will lose an examination opportunity for the interim examination, unless the Examination Board decides otherwise in exceptional cases.

2. The student must register for an interim examination in accordance with the applicable guidelines and instructions, no later than seven days before the interim examination date.
3. If a resit for an interim examination has been taken two or more times, additional requirements are set for subsequent resits.
4. The "Regulations for examination participation" in these EER are applicable in these cases.

#### ***Article 4.3 Confirmation of interim examination results***

1. The result of an interim examination is determined by an examiner in the form of a grade on a scale of 1 (lowest possible grade) to 10 (highest possible grade), consisting exclusively of whole number or half numbers. The grade 5.5, however, is never given. When rounding off between 5 and 6 the rule applies that a grade lower than a 5.5 is rounded down to a five (5) which is an insufficient grade, meaning the educational component has not been successfully completed; while a 5.5 and higher is rounded up to a six (6), meaning that this educational component has been successfully completed. In addition to results in the form of a grade, the assessments "satisfactory" and "not satisfactory" may also be awarded.
2. If a student re-sits an interim examination, the most recent mark will determine the final result.

#### ***Article 4.4 Publication of results***

1. The examiner shall, on the date that an oral interim examination is administered, determine the result and give the student a written statement of this.
2. The examiner shall determine the result of a written interim examination within 15 working days of the date it was administered. Here the precondition applies that there are at least 10 work days between the date of the publication of the result in Osiris and the date of the resit. The examiner will provide the faculty administration office with the necessary details for them to award of the document of proof regarding the student's result. This result must be made available to the student within two work days after the result has been determined.
3. In special cases, the Examination Board may extend the term in which the result must be determined, as referred to in paragraph 2, by a maximum of 10 work days.
4. In instances in which an interim examination is administered in a form other than oral or written, the Examination Board shall determine prior to the administration of the examination how and when the student shall be issued a statement of the result. This term shall not be longer than 30 days after the interim examination was administered.

5. On this statement of the result of an interim examination, the student is informed of his/her right of inspection, referred to in Article 4.5 as well as the right to appeal to the Examination Appeals Board.
6. A student may submit an appeal of a decision by the Examination Board to the Examination Appeals Board within six weeks.

#### ***Article 4.5 Right of inspection and right of cognizance***

1. Within at least 30 days following publication of a written interim examination result, the student may request access to review and inspect all graded work. In relation to the results of interim examinations with "open" questions, at the student's request he/she will be granted at cost price a copy of their graded work.
2. During the period, referred to in paragraph 1 of this Article, any student who has taken an interim examination may review the questions and assignments of the interim examination in question, as well as the standards on which the result was based.
3. The Examination Board may determine that the inspection or review shall take place at a particular location and provide at least two different time periods. If the student demonstrates that he/she is unable to attend the inspection or review as a result of force majeure, then another option shall be offered, if possible within the period stated in paragraph 1 of this Article.
4. In all cases, provided this has been requested by the student in a timely fashion, the inspection must take place a minimum of five working days before the resit of an interim examination.
5. The examiner shall retain all written interim examinations and related papers (assignments or otherwise) that count towards the final result for a period of two years following the date the examination was administered. Master's programme reports and theses must remain available for visitations, accreditations and inspections and shall be kept for seven years.

#### ***Article 4.6 Confirmation of the result of the final examination***

1. The student is given the opportunity to take the final examination after he/she has provided sufficient proof that he/she has passed the components leading up to the final examination.
2. The Examination Board will determine the result of the final examination, as well as the rules in relation to the manner in which the result of the examination is determined.
3. Prior to determining the result of the final examination, the Examination Board may evaluate and assess the student's knowledge with respect to one or more components or aspects of the programme, if and to the degree to which the results of the related interim examinations justify this.

#### ***Article 4.7 Awarding distinctions***

1. With due observance of the provisions set out in this Article, the Examination Board is responsible for the decision of whether a distinction shall be awarded and if so, which distinction.
2. The distinctions
  - a. "cum laude" shall be awarded if the weighted average result of the final assessment of the components referred to in paragraph 3 is equal to or higher than 8.0.

- b. "summa cum laude" shall be awarded if the weighted average result of the final assessment of the components referred to in paragraph 3 is equal to or higher than 9.0.
3. The distinction shall be calculated on the basis of all components of the examination programme for which a mark has been awarded on a scale of 1 to 10, with the exception of extra-curricular components.
  4. The number of EC of the component referred to in paragraph 3 shall serve as the weighting factor for the calculation of the weighted average result, unless provided otherwise in the programme-specific part of these regulations.
  5. The distinction shall not be awarded if more than 10 per cent of the total study load of the examinations for the degree programme (being one or more components) has been re-sat or if interim examinations have been re-sat more than once, unless the Examination Board decides otherwise, stating the reasons for this decision.
  6. The distinction shall not be awarded if fraud was discovered in one of the examinations of the degree programme.
  7. Supplementary to paragraph 2, the degree programme uses the weighing factors below when determining distinctions.

The following criteria are used for awarding the cum laude distinction:

- The EC weighted average of the assessments of all the examination components with a scope of fewer than 20 EC must at least equal 8.0 without any rounding.
- The EC weighted average of the assessments of all the examination components with a scope greater than or equal to 20 EC must at least equal 8.0 without rounding.

The following criteria are used for awarding the summa cum laude distinction:

- The EC weighted average of the assessments of all the examination components with a scope of fewer than 20 EC must at least equal 9.0 without rounding.
- The EC weighted average of the assessments of all the examination components with a scope greater than or equal to 20 EC must at least equal 9.0 without rounding.

#### ***Article 4.8 – Fraud and plagiarism***

1. If an examiner or supervisor suspects or finds proof of fraud, plagiarism or other irregularities during the interim examination or while assessing the interim examination or written assignment, the examiner or supervisor shall inform, in writing, both the relevant programme Examination Board and the student concerned. The student will be permitted to complete the interim examination.
2. The Examination Board will then decide as quickly as possible but at least within 20 work days whether fraud or plagiarism has indeed been committed and what possible actions will be taken. The Examination Board shall not make a decision in this regard until after hearing the student in question, or at least providing the student with the opportunity to be heard. A written report of this hearing shall be made.
3. In the event of fraud or plagiarism, a note of this will be made in the student's file.
4. In case of fraud during an interim examination, the student shall be excluded from further participation in the interim examination and no grade shall be awarded. This means the student will have used up one of his/her interim examination opportunities.

5. In accordance with Article 7.12b paragraph 2 of the Act, the Examination Board may, in case of fraud or plagiarism, bar the student from sitting for one or more interim examinations and/or final examinations at the institute for a maximum period of 12 months.
6. In the event of serious fraud, the institutional board may recommend that the student's enrolment for the degree programme be terminated.
7. In cases of plagiarism, the relevant Examination Board may, in addition to the measures listed under paragraph 5 of this Article, require the student to complete a new assignment on a subject to be determined by the lecturer responsible for that course examination.

## **Section 5 Study performance, support and advice**

### ***Article 5.1 – Study performance and support***

1. The faculty dean is responsible for recording student results in such a way that, upon request, the Examination Board can provide the student with an overview of the progress of the study within a reasonable time of this request.
2. The dean is responsible for providing adequate student counselling.

## **PART III Programme-specific provisions for the MASTER'S PROGRAMME IN COMPUTING SCIENCE**

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### **Section 6 Access to the degree programme and education**

#### ***Article 6.1 Admission requirements***

Admission requirements for the programme:

- a. Students must have successfully completed the final examination of the Radboud University Bachelor's programme in Computing Science; or
- b. Students must have successfully completed the final examination of the Bachelor's programme in Computing Science or Technical Computing Science at another Dutch university; or
- c. Students must be in possession of a degree certificate that is at least equal to the degree referred to in paragraph 6.1 under a; or
- d. For the specialisation Data Science, students must have successfully completed the final examination of the Bachelor's programme in Artificial Intelligence at Radboud University or

- another Dutch university or have passed the final examination of the Bachelor's programme in Knowledge Engineering at Maastricht University; or
- e. Students must have demonstrated suitability for participation in the degree programme, in the opinion of the Examination Board.

And students must provide proof of sufficient proficiency in English, as described in Article 6.3.

### *Article 6.2 Pre-Master's*

Those who have earned a university of applied sciences (HBO) degree in Computing Science or a related area and have completed the corresponding pre-Master's programme curriculum of 30 EC are also admitted to the degree programme.

### *Article 6.3 Language requirements*

1. In addition to the admission requirements described above, sufficient proficiency in English is also required. This language requirement is satisfied if a student:
  - a. Is in possession of a diploma from a university of applied sciences (HBO); or
  - b. Is in possession of a Bachelor's diploma earned at a Dutch university; or
  - c. Has passed one of the following tests:
    - i. The TOEFL with a score of 550 or higher for the paper version;
    - ii. The TOEFL with a score of 213 or higher for the computer version;
    - iii. The TOEFL with a score of 79 or higher for the online version;
    - iv. The IELTS with a score of 6.0 or higher;
    - v. The Cambridge CAE or CPE with a score of C or higher.

The Examination Board may in certain cases assess whether a student has sufficient proficiency in English.

2. A sufficient command of the Dutch language is required to participate in components taught in Dutch. Non-Dutch students have met the language requirement for sufficient proficiency in Dutch if they have passed the state examination of Dutch as a second language, level 2.

The Examination Board may in certain cases assess whether a student has sufficient proficiency in Dutch.

## **Section 7 Structure and design**

### *Article 7.1 Programme-specific learning outcomes*

1. In addition to the general learning outcomes described in Part II of these regulations, the Computing Science degree programme aims to enable students to work and think at an academic level and to ensure that graduates of the programme:
  - a) have thorough academic knowledge and insight in the area of their specialisation (discussed in more detail below per specialisation in points e to h), are experts in a sub-area within their



- specialisation and can contribute to the further academic development within this sub-area, and are able to acquire knowledge, insight and skills in other sub-areas of Computing Science.
- b) can apply their knowledge and skills to research and system development issues, both independently and in small teams. Depending on the chosen specialisation and expertise, the emphasis here may be on research or system development.
  - c) are aware of the social aspects of ICT.
  - d) are capable of communicating at a professional level and providing a clear oral and written presentation of completed work.
  - e) for the specialisation Software Science, graduates possess broad knowledge of state-of-the-art techniques for the development and analysis of software (including software technology, domain-specific languages, computer-aided analysis, and the use of mathematic models and modelling techniques) and are able to apply these techniques.
  - f) for the specialisation Data Science, graduates have a broad overview of the data science discipline (incl. algorithmic, organisational, software, hardware and ethical aspects), are able to use appropriate data science techniques to extract data from databases, are experienced with specifying, designing and creating applications in which data science plays an important role, and can contribute to discussions about the role of data science in society.
  - g) for the specialisation Cyber Security, graduates possess broad knowledge of information and computer security (including organisational, software, hardware, network, cryptographic, legal and privacy aspects), can evaluate the security aspects of existing systems and systems yet to be developed and to this end are able to formulate and prioritise safety requirements, are experienced in specifying, designing or developing applications in which safety plays an important role, and can contribute to discussions on the role of cyber security and privacy in society.
  - h) for the specialisation Mathematical Foundations of Computer Science, graduates have a broad knowledge of theoretical computing science and the mathematics that serve as its foundation and can apply mathematical techniques (such as logic and algebra) in modelling and analysing computing science concepts.
2. Students who choose the specialisation Science, Management and Innovation as described in Article 3.3 paragraph 3a, also have the following learning outcomes:
- a) Graduates have gained deep knowledge on their theme, based on connections made between their own science discipline and other science disciplines, on the one hand, and approaches from fields that study society, politics and policy, economics and companies (remember/understand).
  - b) With this knowledge, graduates can analyse specific problems within their theme, are able to list a range of approaches to address the problem, and argue for and select feasible options, taking into account the full width of technological, societal, political and economic perspectives (understand/analyse).

- c) The students are proficient in the use of methods and techniques, including basic financial and economic ones, to substantiate strategies and plans, and are able to effectively use a wide variety of information and communication channels (apply/evaluate).
  - d) The students can balance perspectives and interests in the specific context of a company, governmental organisation or international organisation, or in configurations of those and other actors, in order to formulate feasible strategies and plans to implement options to address their thematic challenges (evaluate/create).
  - e) The students are capable of clearly communicating their insights and choices to others, both in written and in spoken form (communicate).
  - f) The students are capable of working in multidisciplinary teams; they know how to divide tasks based on knowledge and competencies and how to take responsibility, and they respect diverging views.
3. Students who choose the specialisation Science, Management and Innovation as described in Article 3.3 paragraph 3b, also have the following learning outcomes:
- a) The students are capable of analysing the role of scientific expertise in societal and political decision making with regard to socio-scientific issues .
  - b) The students are capable of designing and conducting independent and methodologically sound social research at the interface of science and society and capable of contributing to academic research.
  - c) The students are capable of understanding and designing public and stakeholder participation processes in research and innovation.
  - d) The students are capable of analysing, improving and evaluating interdisciplinary collaborations with multiple stakeholders, integrating different perceptions, interests and types of knowledge (experiential, professional and scientific).
  - e) The students are capable of substantiating and communicating the relevance of their scientific discipline in society .

#### **Article 7.2 Programme type**

The programme is only offered full-time.

#### **Article 7.3 Programme language**

The degree programme is taught in English

#### **Article 7.4 Composition of the programme**

1. Subject to the provisions in Part II of these regulations, the student chooses one of the following specialisations of the degree programme:
  - a) Software Science
  - b) Data Science
  - c) Cyber Security (TRU/e), offered in collaboration with TU/e
  - d) Mathematical Foundations of Computer Science (MFoCS)
  - e) Science, Management and Innovation

f) Science in Society

- Students must select their specialisation through Osiris within two months of the start of the Master's programme.

### Article 7.4a Master's specialisation in Software Science

The Master's specialisation in Software Science consists of the following components:

#### 1. Compulsory courses (27 EC)

Course code	Course name	EC
NWI-I00032	Advanced Programming	6
NWI-IMC046	Model Checking	6
NWI-I00110	Testing Techniques	6
NWI-IMI003	Philosophy and Ethics for Computing and Information Science	3
NWI-IMC045	Research Seminar Software Science	6

#### 2. Choice of sub-specialisation (24 EC)

Can be freely selected from the categories below.

Software Technology & Engineering category

Course code	Course name	EC
NWI-IMC004	Compiler Construction	6
NWI-I00155	Design of Embedded Systems	6
NWI-IMI004	Software Development Entrepreneurship	6
NWI-ISOFSE	Software Security	6

Computer-Aided Analysis category

Course code	Course name	EC
NWI-IMC035	Software Analysis	6
NWI-IMC009	Automated Reasoning	6
NWI-I00139	Proof Assistants	6

Theory of Computation category

Course code	Course name	EC
NWI-IMC010	Type Theory and Coq	6
NWI-IMC011	Semantics and Domain Theory	6
NWI-IMC036	Coalgebra	6
NWI-WM072B	Complexity Theory	6
NWI-WM120B	Computability Theory	8

**3. External selection (12 EC)**

To be chosen from outside the list of specialisation courses shown under 2 above, to be presented for approval to the Examination Board. Courses from the Master's programme in Computing Science are automatically approved.

**4. Free electives (12 EC)**

**5. Research internship (15 EC)**

Course code	Course name	EC
NWI-IMC047	Research Internship	15

To be decided in consultation with the coordinator of the specialisation Software Science. All ICIS divisions are automatically approved as internship departments.

**6. Graduation thesis (30 EC)**

A graduation thesis of 30 EC, to be decided in consultation with one of the ICIS staff members as supervisor.

**Article 7.4b Master's specialisation in Data Science**

The Master's specialisation in Data Science consists of the following components:

**1. Compulsory courses (27 EC)**

Course code	Course name	EC
NWI-I00041	Information Retrieval	6
NWI-IMC030	Machine Learning in Practice	6
NWI-IMC012	Baysian Networks	6
NWI-IMI003	Philosophy and Ethics for Computing and Information Science	3
NWI-IMC044	Research Seminar Data Science	6

**2. Choice of sub-specialisation (24 EC)**

Can be freely selected from the categories below.

Data Science Theory and Tools category

Course code	Course name	EC
NWI-NB054E	Statistical Machine Learning	6
NWI-IMC042	Natural Computing	6
NWI-NMC048C	Machine Learning	9

Data Science Applications category

Course code	Course name	EC
NWI-IMC037	Intelligent Systems in Medical Imaging	6
SOW-MKI49	Computational Neurocognitive Modelling	6
NWI-SM299	Pattern Recognition for the Natural Sciences	3
LET-REMA-LCEX06	Text Mining	6

Data Science Aspects category

Course code	Course name	EC
NWI-IMC006	Law in Cyberspace	6
NWI-I00035	Foundations of Information Systems	6
NWI-I00054	Cognition and Representation	6
SOW-MKI61	Cognitive Computational Modelling of Language and Web Interaction	6

**3. External selection (12 EC)**

To be chosen from outside the list of specialisation courses shown under 2 above, to be presented for approval to the Examination Board. Courses from the Master's programme in Computing Science and the Master's programme in Artificial Information are automatically approved.

**4. Free electives (12 EC)**

**5. Research internship (15 EC)**

Course code	Course name	EC
NWI-IMC047	Research Internship	15

To be decided in consultation with the coordinator of the specialisation Data Science. All ICIS divisions are automatically approved as internship departments.

**6. Graduation thesis (30 EC)**

A graduation thesis of 30 EC, to be decided in consultation with one of the ICIS staff members as supervisor.

**Article 7.4c Master's specialisation in Cyber Security (TRU/e)**

The Master's specialisation in Cyber Security consists of the following components:

**1. Compulsory courses (at least 38 EC)**

Course code	Course name	EC
NWI-IMC051	Software Security	5
NWI-IMC053	Security in Organisation	5
NWI-IMC050	Advanced Network Security	5
NWI-TRUE01	Principles of Data Protection (at TU/e)	5

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NWI-TRUE02	Cryptology (at TU/e)	5
NWI-TRUE07	Verification of Security Protocols (at TU/e)	5
NWI-IMI003	Philosophy and Ethics for Computing and Information Science	3
NWI-I00136	Privacy Seminar	6
of NWI-TRUE08	Seminar Information Security Technology (at TU/e)	5

**2. Choice of sub-specialisation (at least 15 EC)**

At least 3 courses, to be freely selected from the list below.

Course code	Course name	EC
NWI-IMC001	Hardware Security	6
NWI-IMC006	Law in Cyberspace	6
NWI-IMC039	Cryptographic Engineering	6
NWI-TRUE03	Physical Aspects of Digital Security (at TU/e)	5
NWI-TRUE04	Applied Cryptography (at TU/e)	5
NWI-TRUE05	Cryptology (at TU/e)	5
NWI-TRUE06	Cryptographic Protocols (at TU/e)	5

**3. External selection (at least 6 EC)**

To be chosen from outside the list of specialisation courses shown under 2 above, to be presented for approval to the Examination Board. Courses from the Master's programme in Computing Science are automatically approved.

**4. Free electives (at least 12 EC)**

**5. Research internship (15 EC)**

Course code	Course name	EC
NWI-IMC047	Research Internship	15

To be decided in consultation with the coordinator of the specialisation Cyber Security. All ICIS divisions are automatically approved as internship departments.

**6. Graduation thesis (30 EC)**

A graduation thesis of 30 EC, to be decided in consultation with one of the ICIS staff members as supervisor.

**Article 7.4d Master's specialisation Mathematical Foundations of Computer Science (MFoCS)**

The Master's specialisation Mathematical Foundations of Computer Science consists of the following components:

**1. Compulsory courses (18 EC)**

Course code	Course name	EC
NWI-IMC010	Type Theory and Coq	6

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NWI-WM096B	Computer algebra	6
NWI-IMI003	Philosophy and Ethics for Computing and Information Science	3
NWI-IMC049	MFoCS Seminar	3

**2. Choice of sub-specialisation (30 EC)**

To be freely selected from the categories below, with at least 6 EC from the category RU-CS and at least 6 EC from the category RU-Maths, and to be presented for approval to the Examination Board. In addition to the courses below, courses of the national MasterMath programme may also be included in the choice of sub-specialisation.

RU-CS category:

Course code	Course name	EC
NWI-I00032	Advanced Programming	6
NWI-IMC009	Automated Reasoning	6
NWI-IMC004	Compiler Construction	6
NWI-IMC046	Model Checking	6
NWI-I00139	Proof Assistants	6
NWI-IMC011	Semantics and Domain Theory	6
NWI-NB054E	Statistical Machine Learning	6
NWI-IMC035	Software Analysis	6

RU-Math category:

Course code	Course name	EC
NWI-WM072B	Complexity Theory	6
NWI-WM120B	Computability Theory	8
NWI-WB070B	Intuitionistic Mathematics	6
NWI-WM040B	Philosophy of Mathematics	3
NWI-IMC036	Coalgebra	6
NWI-WM038B	Axiomatic Set Theory	8
NWI-WM135	Independence Proofs in Set Theory	6

**3. Limited choice electives (26 EC)**

To be presented for approval to the Examination Board. Courses from the Master's programme in Computing Science and Mathematics are automatically approved.

**4. Free electives (6 EC)**

**5. Graduation thesis (40 EC)**

A graduation thesis of 40 EC, to be decided in consultation with one of the ICIS staff members as supervisor.

#### **Article 7.4e Master's specialisation in Science, Management and Innovation and Science in Society**

The programme-specific part (60 EC), as referred to in Article 3.3 paragraph 5,

- a. both for the Master's specialisation Science, Management and Innovation and the Master's specialisation Science in Society consists of the programme-specific courses (51 EC): the compulsory courses (27 EC, including the seminar course and the Philosophy and Ethics for Computer and Information Science course) and the choice of sub-specialisation (24 EC) of the specialisation Software Science or the specialisation Data Science.
- b. Free electives (9 EC)

The faculty portion of these specialisations are described in Article 3.3 paragraphs 6 and 7.

As referred to in Article 3.3, paragraph 6a, within the Master's programme in Computing Science the specific social beta theme Managing ICT Innovations may be selected along with the course curriculum listed below, with the first course serving as the core theme course:

Course code	Course name	EC
NWI-IMI004	Software Development Entrepreneurship	6
NWI-IMC021	System Development Management	6

#### **Article 7.4f Deviating programme**

If a student does not choose a specialisation, he/she must submit a motivated request for permission to the Examination Board for an alternative course selection for the Master's programme. The submitted course selection must include at least 60 EC of the total 120 EC. Compulsory components of the deviating programme include the course NWI-IMI003 Philosophy and Ethics for Computing and Information Science (3 EC) and the Graduation thesis (30 EC).



## Part IV – Transitional and final provisions

### Section 9 Transitional provisions

Not applicable in 2016-2017.

### Section 10 Final provisions

#### *Article 10.1 Safety net scheme and hardship clause*

1. In any situations which are not fully or clearly covered by these regulations, the decision lies with the dean.
2. Any situations which these regulations may result in unreasonable hardship for individual students, the Examination Board or the dean is authorised to make an exception to the provisions in the Education and Examination Regulations.

#### *Article 10.2 Confirmation and amendments*

1. Notwithstanding the provisions in Article 7 of the Structure Regulations, these regulations are drawn up or amended by the dean after receiving advice from the programme committees and after having obtained approval from the faculties' general assembly.
2. An amendment to these regulations cannot enter into force in the current academic year, unless the situation has the potential to make it extremely difficult for the student to participate in the programme.
3. **Article 10.3 Entry into force**

These regulations shall enter into force on 1 September 2016.

#### *Article 10.4 Publication*

1. The dean is responsible for publishing these regulations and any amendments thereto.
2. Interested parties may consult these regulations on the website: [www.radboudnet.nl](http://www.radboudnet.nl) or [www.student.ru.nl](http://www.student.ru.nl)

As established by the dean on August 29, 2016

## Regulations for examination participation

These regulations are applicable to all students at the Faculty of Science and are in regards to the central registration and deregistration for examinations and the application procedure for additional examination opportunities.

1. A student has two examination opportunities for each component.
2. By registering for a course in Osiris, you will be automatically registered for the first examination opportunity.
3. Contrary to point 2, students are required to register for all other examinations through Osiris. This is possible up to 7 days before the examination.
4. Students can deregister for the examination in Osiris up to 1 day before the examination date.
5. After the time period mentioned in point 4, students can only personally deregister directly with the lecturer up until the starting time of the examination.
6. If a student does not sit the examination without having deregistered through one of options stipulated above, they lose an examination opportunity (1 of 2). This is logged in the examination administration as “ND” (“niet deelgenomen” - did not participate).
7. If the student can demonstrate that they were unable to take the examination or deregister in a timely fashion due to mitigating circumstances, the Examination Board may decide to disregard the original registration for the examination.
8. If the examination has not been passed after the second attempt, the student must get permission from the lecturer to take part in the examination each additional time he/she wishes to take it. This permission is requested via an online form: <http://www.radboudnet.nl> or [www.student.ru.nl](http://www.student.ru.nl). The student must hand in the form signed by the lecturer to the Student Service Desk. The Student Service Desk handles the examination registrations. The student can check their registration in Osiris.
9. These regulations are in effect from 1 September 2016.

## **Code of Conduct for foreign language use, as referred to in Article 7.2 (c) of the Higher Education and Research Act (the Act)**

(Agreed upon by the Executive Board)

At Radboud University the following code of conduct applies:

### Article 1

At Radboud University Nijmegen, allowance for administering examinations and interim examinations in a language other than Dutch will be considered if the specific nature, design or quality of the education or nationality of the students necessitate this.

### Article 2

A decision to use a foreign language will be made by the dean of the faculty in question, after having received advice from the programme committee. The dean will observe the following principles:

- the need to use a different language other than Dutch must be clear;
- examinations and interim examinations for English-speaking degree programmes are administered in English; interim examinations of courses taught in English are administered in English, unless the examination committee of the degree programme in question decides otherwise;
- education in a foreign language must meet the same quality standards as education in Dutch.

### Article 3

The decision by the dean is included in the education and examination regulations of the degree programme.

### Article 4

The dean of the faculty will report his/her decision to the Executive Board.