Education and Examination Regulation 2017-2018

Master Computing Science

Radboud Universiteit

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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 programmes of the Faculty of Science and outline the applicable procedures, rights and obligations concerning teaching, interim examinations and final examinations.

2. The present regulations apply to all students enrolled in a Faculty of Science degree programme in the academic year 2017-2018. Students who enrolled in their programme before 1 September 2016 should appeal to the EER in effect at the time of their first enrolment for the programme, if they have continuously been enrolled.

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.

4. The faculty offers the following 60-EC Master's programmes:
   a. Information Sciences.

5. All degree programmes are offered exclusively as full-time programmes.

6. The programmes are taught completely in English. The Science and Education specialisation is taught in Dutch.
   1.

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 terms below will be understood to have the following meaning:
   a. Degree programme: the Bachelor's programme referred to in Article 7.3a, paragraph 1 of the Act;
   b. Component: an educational unit as referred to in Article 7.3, paragraphs 2 and 3 of the Act;
   c. Student: anyone enrolled at Radboud University for participation in a degree programme and/or in the courses or final examinations of a programme;

d. First year: the foundational year (propedeutic phase) of the programme, as referred to in Article 7.8 of the Act;

e. Academic year: the period of time from 1 September until 31 August the next calendar year;

f. Practical exercise: a practical exercise as referred to in Art. 7.13 paragraph 2 under D of the Act;

g. 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;

h. 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 Bachelor's (propedeutic and core phase) 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);

i. Fraud: every (lack of) action by a student aimed, or partially aimed, at making it impossible to accurately assess the knowledge, insight, and skills of the student, or of another student;

j. 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;

k. Examiner: the person designated by the Examination Board to administer the interim examination, in accordance with Article 7.12 of the Act;

l. 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;

m. Work day: Mondays to Fridays, with the exception of official holidays and any other days marked by Radboud University as collective holidays;

n. Awarding of the degree certificate: the formal confirmation that all the examination requirements have been met;

o. Study guide: the guide for a particular degree programme of the Faculty of Science, containing specific information for the Bachelor's programme;

p. The university: Radboud University;

q. The faculty: The Faculty of Science;

r. Minor: a cohesive selection of components;

s. Free elective: a freely selected, academic, assessable component.

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PART II PROVISIONS APPLICABLE TO ALL MASTER'S PROGRAMMES

Section 2. Access to the degree programmes and education

Article 2.1 Admission and admission requirements

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

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

Article 2.3 Language requirements

1. A sufficient command of the English language is required to participate in the programme and possibly to sit for examinations in English. This requirement is met if the student:

   a. is from an English-speaking country. The Faculty of Science understands the following countries to be English-speaking countries: Australia, Canada (with the exception of Quebec), Ireland, New Zealand, Singapore, South Africa, the United Kingdom, and the United States of America; or

   b. has a diploma for pre-university education (VWO); or

   c. has a diploma for pre-university education obtained at an English-language institution in the Netherlands or abroad; or

   d. has a diploma for pre-university education obtained at a German secondary education institution, with English as Grundkurs; or

   e. has a Bachelor's diploma for a university of applied sciences (HBO); or

   f. has a Bachelor's diploma earned at a Dutch university; or

   g. een van de onderstaande toetsen heeft afgelegd:

      i. the TOEFL with a score of 575 or higher for the paper version;

      ii. the TOEFL with a score of 90 or higher for the Internet version, with no sub-scores lower than an 18;

      iii. the IELTS with a score of 6.5 or higher, with no sub-scores lower than a 6,0;

      iv. the Cambridge CAE or CPE with a score of C or higher.

   4. In certain cases, the Examination Board may assess whether a student has sufficient proficiency in English.

2. A sufficient command of the Dutch language is required to participate in courses and examinations taught or given 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.

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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

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. Preparation for future career.
    d. Strengthen qualifications in the area of independent academic research;

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 research specialisations and societal specialisations. The specialisations are decribed in the programme specific part of these EER.
3. The elective courses cannot have a substantial overlap in content with courses from the mandatory component. It is not possible to receive an exemption for the elective component based on a Bachelor's course.
4. 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   Type of interim examination

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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. Proficiency test
   e. The production of a product or text.
2. For each component, the examiner will announce through the prospectus the form in which the interim examinations will be administered prior to the commencement of the academic year. The Examination Board may determine that the type of interim examination be changed from what was stated in the prospectus per request by a student or the examiner. This change cannot disadvantage the student.
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 a 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.

Article 3.5   Exemptions

1. At the request of a student and having heard the examiner involved, the Examination Board may exempt the student, either partially or fully, from 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. If the programme has generic exemptions, these can be found in the programme specific component of these EER.
3. Students who were first enrolled in 2017/2018 can never have more exemptions, as stated in paragraph 1, a fourth of the total study load of the programme expressed in ec.
4. 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,

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provided these were earned as extracurricular Bachelor's components and correspond to the Master's components.

5. Exemptions as referred to in paragraphs 1 and 2 cannot be granted for final examination papers.

Article 3.6   Term of validity of successfully completed interim examinations
The term of validity of successfully completed interim examinations is unlimited.

Article 3.7   Individual degree programme
A request for an individual degree programme as stated in Article 7.3d of the Act must be approved by the Examination Board. The Examination Board checks if the programme fits within the domain of the programma, whether there is enough cohesion in the programme, and if the level is high enough to meet the standards of the programme.

Section 4.   Examinations

Article 4.1   Frequency of interim examinations
1. The opportunity to participate in a lab (course) is offered at least once a year.
2. Students are given at least two opportunities per year to take interim examinations.
3. Contrary to the stipulation in the second 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 the previous academic year.
4. If a certain component is not given in a particular year, the opportunity to take the corresponding examination will be offered 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.
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.

Article 4.3   Confirmation of interim examination results

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1. The result of an interim examination is determined by an examiner in the form of a grade on a scale of 1 to 10 (with 10 as the 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 is that a grade lower than 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 10 work days of the date it was administered for interim examinations in the propedeutic phase and within 15 working days for interim examinations in the core phase. The precondition applies that there must be 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 the document of proof regarding the student's result. This result must be made available to the student within two working 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 cognisance

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. For the results of interim examinations with "open" questions, at the student's request he/she shall be granted a copy of their graded work at cost.

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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 Examination Board 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 when the examination was administered. Bachelor'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 that 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 of assessments of all exam components with less than 20 ec is equal to an 8.0 and the weighted average of the assessments of components with 20 ec or more is at least equal to an 8.0.
   b. "summa cum laude" shall be awarded if the the weighted average of assessments of all exam components with less than 20 ec is equal to an 9.0 and the weighted average of the assessments of components with 20 ec or more is at least equal to an 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.

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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. If a student does not deregister on time, their non-participation in the exam will be seen as a used exam opportunity, unless the Examination Board decides otherwise. If a student can prove that they were unable to participate or deregister on time due to a force majeure, the Examination Board can decide to retroactively deregister the student.

7. The distinction shall not be awarded if fraud was discovered in one of the examinations of the degree programme.

Article 4.8   Fraud and plagiarism

5. Supplement to Article 1.2 paragraph 1 sub-paragraph i, the faculty describes fraud as:
   a. Fraud with midterms, labs, and exams, such as
      i.   having tools which are not allowed;
      ii.   cheating or exchanging information;
      iii. pretending to be someone else, or having someone else represent as you during a midterm or exam;
      iv.   possession of the exam questions prior to the exam;
      v.   changing answers after the work has been handed in for assessment;
      vi.   providing incorrect information when requesting an exemption.
   b. Fraud in theses and other written works, such as
      i.   plagiarism by using or copying other people's text, data, or ideas without correct or complete sourcing;
      ii.   plagiarism by using another student's work and presenting it as your own;
      iii. fabricating or falsifying research data;
      iv.   handing in a thesis or other work created by someone else.

6. An attempt to commit fraud is also seen as fraud under this regulation.

7. The surveyor or examiner will immediately notify the student if they are being suspected of fraud.

8. The surveyor or examiner can order the student to make material available if they are being suspected of fraud. Refusal to do so is equated with fraud.

9. If suspicion arises during the exam, the student will be allowed to finish the exam.

10. The examiner makes a report on the suspicion of fraud and makes this report available to the student and the Examination Board.

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11. The Examination Board will start an investigation. The student will be allowed to send in a written response to the report in paragraph 6. The Examination Board will hear both the examiner and the student.

12. The Examination Board will decide on the matter within 20 working days after receiving the report stated in paragraph 6. The Examination Board will notify the student and examiner with a written statement of their decision. The 20 working day period can be extended with ten days.

13. The Examination Board declares, if fraud has been established, the exam, thesis, or work in question to be invalid.

14. The Examination Board will not award an adjudication if fraud has been established.

15. The Examination Board clearly states the establishment of fraud and the penalties in the student's file.

16. The Examination Board can determine that a student is not allowed to participate in one or more exams for at most a year and only if fraud has been established.

17. The Examination Board can determine that a student is not allowed to hand in a thesis or written work for at most a year, if fraud has been established.

18. The Examination Board can suggest that the Executive Board terminates the student's enrolment in case of severe fraud.

19. In case of fraud, the Dean of the Honours Academy can determine, after a suggestion by the Examination Board, that the student can no longer participate in the university or faculty Honours Academy.

Section 5. Study performance, support, advice and education evaluation

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 respond by providing the student with an overview of the progress of the study within a reasonable timeframe.
2. The dean is responsible for providing adequate student counselling.

Article 5.2   Method of education evaluation
Considering the care for quality in the institution, as described in the Quality Education Handbook by Radboud University, the dean oversees that the quality of education is systemically evaluated.

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PART III   PROGRAMME-SPECIFIC PROVISIONS

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.

f. 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 2.2.

    20.

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.

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. algorhythmic, 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 7.2e , also have the following learning outcomes:
a. Capable of bridging between their own science discipline and other disciplines, based on profound understanding of the chosen core theme and how this relates to societal, political, economic, and environmental requirements of today's world.
b. Familiar with and capable of analysing specific problems within their theme, and able to apply a range of approaches to address these, argue for, select, and implement feasible options, taking into account the full width of technological, societal, political and economic perspectives.
c. Proficient in using research methods and techniques, including basic finance and economics, to verify, justify and substantiate strategies and plans, and capable of effectively using a wide variety of information and communication channels.
d. Capable of balancing perspectives and interests in specific contexts within a company or (non)governmental organisation in order to formulate appropriate strategies and plans towards implementation of the Sustainable Development Goals (SDGs).
e. Capable of communicating insights, views and analyses of complex issues to others in a clear, concise and understandable manner, both in written and spoken form.

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f. Capable of working in multidisciplinary and multicultural high-performance teams based on sound division of tasks, knowledge, competencies, and responsibilities, whilst respecting diverging views and opinions.

3. Students who choose the specialisation Science in Scoiety as described in Article 7.2f , also have the following learning outcomes:
    a. Capable of analyzing the role of scientific expertise in societal and political decision making with regard to socio-scientific issues
    b. 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. Capable of understanding and designing public and stakeholder participation processes in research and innovation
    d. Capable of analyzing, improving and evaluating interdisciplinary collaborations with multiple stakeholders, integrating different perceptions, interests and types of knowledge (experiential, professional and scientific)
    e. Capable of substantiating and communicating the relevance of one's scientific discipline in society

Article 7.2   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), verzorgd i.s.m. de TU/e
    d. Mathemical Foundations of Computer Science (MFoCS)
    e. Science, Management and Innovation
    f. Science in Society
2. Students must select their specialisation through Osiris within two months of the start of the Master's programme.
3. In deviation of article 3.3 paragraph 3, the Computing Science programme does not have a portfolio component. Career orientation happens within a number of courses.

Artikel 7.2a   Master's Specialisation Software Science

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

1. Compulsory components (27 ec)

Course code	Course name	Ec
NWI-I00032	Advanced Programming	6
NWI-I00155	Design of Embedded Systems	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. Specialisation electives (24 ec)

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Can be freely selected from the components below:

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
NWI-I00139	Proof Assistants (wordt in 17-18 niet aangeboden)	6
NWI-IMC035	Software Analysis	6
NWI-IMC009	Automated Reasoning	6
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

21.

3. Electives (18 ec)

Master courses to be approved by the Examination Board: courses from the Computing Science Master's programme are always approved. The Examination board can also approve using Bachelor's courses in the elective space, if the student can give a motivation and the Bachelor's courses have a thematic coherency with the other courses in the elective space.

4. Free elective (6 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 7.2b   Master's Specialisation Data Science
The Master's specialisation in Data Science consists of the following components:

1. Compulsory components (27 ec)

Course code	Course name	Ec

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

> 1.

2. Specialisation electives (24 ec)

Can be freely selected from the components below:

Course code	Course name	Ec
NWI-NB054E	Statistical Machine Learning	6
NWI-IMC042	Natural Computing	6
NWI-NMC048C	Machine Learning	9
NWI-IMC037	Intelligent Systems in Medical Imaging	6
SOW-MKI49	Computational Neurocognitive Modeling	6
NWI-SM299	Pattern Recognition for the Natural Sciences	3
LET-REMA-LCEX06	Text Mining	6
NWI-IMC006	Law in Cyberspace	6
NWI-I00035	Foundations of Information Systems	6
NWI-I00054	Cognition and Representation	6
SOW-MKI51	Artificial Intelligence at the Webscale	6

> 2.

3. Electives (18 ec)

Master courses to be approved by the Examination Board: courses from the Computing Science or Artificial Intelligence Master's programme are always approved. The Examination board can also approve using Bachelor's courses in the elective space, if the student can give a motivation and the Bachelor's courses have a thematic coherency with the other courses in the elective space.

4. Free elective (6 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.

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Artikel 7.2c   Master's Specialisation Cyber Security (TRU/e)

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

1.   *Compulsory components (38 ec)*

Course code	Course name	Ec
NWI-IMC051	Software Security	5
NWI-IMC053	Security in Organisations	5
NWI-IMC050	Advanced Network Security	5
NWI-TRUE01	Principles of Data Protection (aan de TU/e)	5
NWI-TRUE02	Cryptology (aan de TU/e)	5
NWI-TRUE07	Verification of Security Protocols (aan de 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 (aan de TU/e)	5

2.   *Specialisation electives (15 ec)*

At least 3 courses, which can be freely selected from the components 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 (aan de TU/e)	5
NWI-TRUE04	Applied Cryptography (aan de TU/e)	5
NWI-TRUE05	Hacker's Hut (aan de TU/e)	5
NWI-TRUE06	Cryptographic Protocols (aan de TU/e)	5

3.   *Electives (12 ec)*

Master courses to be approved by the Examination Board: courses from the Computing Science Master's programme are always approved. The Examination board can also approve using Bachelor's courses in the elective space, if the student can give a motivation and the Bachelor's courses have a thematic coherency with the other courses in the elective space.

4.   *Free electives (10 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 and EIPSI at the TU/e divisions are automatically approved as internship departments.

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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.

Artikel 7.2d   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 components (18 ec)

Course code	Course name	Ec
NWI-IMC010	Type Theory and Coq	6
NWI-WM096B	Computer algebra	6
NWI-IMI003	Philosophy and Ethics for Computing and Information Science	3
NWI-IMC049	MFoCS Seminar	3

2. Specialisation electives (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.

RU-CS category:

Course code	Course name	Ec
NWI-I00032	Advanced Programming	6
NWI-IMC009	Automated Reasoning	6
NWI-IMC004	Compiler Construction	6
NWI-I00155	Design of Embedded Systems	6
NWI-I00139	Proof Assistants (wordt in 17-18 niet aangeboden)	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 (wordt in 17-18 niet aangeboden)	6
NWI-WM038B	Axiomatic Set Theory	8

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NWI-WM135	Independence Proofs in Set Theory	6

3. Electives (26 ec)

Master's level courses which content fits with the themes in Mathematical Foundations of Computing Science, need to be approved by the Examination Board. Courses from the Computing Science, Mathematics, or the national MasterMath programme are always approved.

4. Free electives (6 ec)
5. Graduation thesis (40 ec)

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

Artikel 7.2e   Masterspecialisatie Science, Management and Innovation

The Master's specialisation Science, Management and Innovation consists of the following components:

1. Compulsory components (15 ec)

Course code	Course name	Ec
NWI-FMT003E	Innovation Management	6
NWI-FMT024	Policy and Economics	3
NWI-FMT006A	Entrepreneurship: Making a Business Plan	3
NWI-FMT019	Methods in Societal Research: Science, Management & Innovation	3

2. Theme components (12 ec)

Choose one of the themes:

a. Climate and Energy

Course code	Course name	Ec
NWI-FMT022	Energy and Climate	6
Choose from 6 ec of the courses below:		
NWI-FMT020	Bio-economy	3
NWI-FMT026	Energy Modelling	3
NWI-MM020A	Environmental Life Cycle Assessment	3

b. Health

Course code	Course name	Ec
NWI-FMT023	The Future of Health	6
Choose from 6 ec of the courses below:		

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NWI-FMT025B	From Lab to Clinic	6
NWI-FMT027	Health Policy: From Local to Global	3
NWI-FMT028	Financial Sustainability and solidarity in healthcare: the Dutch health system's challenges	3

c. Managing ICT Innovations

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

3. Disciplinaire cursussen (51 ec)

Choose one of the Data Science or Software Science course packages, as described in article 7.2a paragraph 1 and article 7.2b paragraph 1.

4. Free electives (12 ec)
5. Science, Management and Innovation Final research project (30 ec)

Artikel 7.2f Masterspecialisatie Science in Society
The Master's specialisation Science in Society consists of the following components:

1. Compulsory components (21 ec)

Course code	Course name	Ec
NWI-FC002B	Science and Societal Interaction	3
NWI-FC003B	Research, Responsibility and Uncertainty	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: Science in Society	3

2. Disciplinary courses (51 ec)

Choose one of the Data Science or Software Science course packages, as described in article 7.2a paragraph 1 and article 7.2b paragraph 1.

3. Electives (6 ec)

To be filled in with courses that are related to the subject of the graduation project. These courses need to be approved by the SiS coordinator.

4. Free electives (12 ec)
5. Science in Society internship and report (30 ec)

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The SiS graduation project can, in consultation with a SiS teacher, be done internally (at the SiS department) or externally (government, consultation bureau, NGO's etc.). In the first month, the student writes a research plan which needs to be approved by the supervisor and second reader. The assessment of the thesis is conducted on the basis of the 'graduation project guidelines SiS'.

Artikel 7.3   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).

Article 8.   Transition provisions

For students of Software Science, the following applies:

- NWI-I00155 Design of Embedded Systems (6 ec) can be replaced by NWI-IMCO46 Model Checking (6 ec)

For students of the Science, Management and Innovation programme, the following applies:

- NWI-FMT021 Neuroscience (3 ec) can be used within the 6 ec elective space in the Health elective courses.

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PART IV   FINAL PROVISIONS

Section 9.   Final provisions

Article 9.1   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 9.2   Adoption and amendment
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. In derogation from paragraph 1, the dean is authorised to drop elective components of the curriculum should the circumstances be deemed impossible to offer the course.

Article 9.3   Entry into force
These regulations shall enter into force on 1 September 2017.

Article 9.4   Publication
1. The dean is responsible for publishing these regulations and any amendments thereto.
2. Interested parties may consult these regulations through the prospectus.

As established by the dean on June 27, 2017.

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