Education and Examination Regulation 2020-2021

Master Mathematics

Radboud Universiteit

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[1] These Education and Examination Regulations are a translation of a Dutch-language document. The original Dutch OER takes precedence over all its translations and therefore, no rights can be derived from this translation.

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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 (the degree programme in which the student is enrolled is hereinafter referred to as "the programme"), including all their components, of the Faculty of Science. These EER outline the applicable procedures, rights, and obligations concerning teaching, interim examinations, and final examinations.
2. The present regulations apply to all students enrolled in the programme in the 2020-2021 academic year. Students who started the degree programme before 1 September 2016 and have been continuously enrolled in this programme may appeal to the EER which was active at the time of their initial enrolment in the programme.
3. Course components provided by a different faculty or institution that are followed as part of the degree programme are subject to the rules applicable at that faculty or institution. Components offered by the Faculty of Science are at all times subject to the regulations described in at least one of the EERs of the Faculty of Science.
4. The faculty offers the following 120-EC Master's programmes:
   a. Biology;
   b. Chemistry (being phased out);
   c. Computing Science;
   d. Mathematics;
   e. Medical Biology;
   f. Molecular Life Sciences (being phased out);
   g. Molecular Sciences
   h. Physics and Astronomy;
   i. Science (being phased out);
5. The faculty offers the following 60-EC Master's programmes:
   a. Information Sciences.
6. All degree programmes are offered exclusively as full-time programmes.
7. The programmes are taught in English, with the exception of the educational components of the Faculty of Science Education and Science specialisations which are taught in Dutch.

Article 1.2 Definition of terms

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 Master's degree 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 or in the partial examinations or final examinations of a programme;
   d. Academic year: the period from 1 September in a given year until 31 August of the following year;
   e. Practical: a practical exercise as referred to in Article 7.13 paragraph 2 under D of the Act;
   f. Interim examination: an examination testing the knowledge, understanding or skills of the student in relation to a certain unit of study, as well as the assessment of the results of this examination, which is administered by at least one examiner designated by the Examination Board. For the purpose of these regulations, a partial examination or a resit is also considered an interim examination;
   g. Partial examination: an examination of the knowledge, insight, and skills of the student, as well as the assessment of the results of the examination, which in conjunction with one or more other partial examinations constitute the interim examination as referred to under paragraph f. In these regulations, when the term examination is used this can also be read as partial examination, unless explicitly indicated otherwise;
   h. Resit: a new opportunity to take a particular examination as referred to in Article 7.10 paragraph 1 of the Higher Education and Research Act (WHW). In these regulations, when the term examination is used this can also be read as resit, unless explicitly indicated otherwise;
   i. Final examination: an assessment, on the basis of which the Examination Board determines whether all the components pertaining to the Master's programme have been completed successfully. The Examination Board may decide that the final examination also includes an investigation by the Examination Board into the knowledge, insight, and skills of the candidate, as well as the assessment of the outcomes of that investigation (in accordance with Article 7.10 WHW);
   j. 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. The Regulations

on Fraud during Interim Examinations and Examinations are included as an appendix to these EER;

k. Examination Board: the examination board of a degree programme, established in accordance with Article 7.12 of the Act. Also see the Radboud University Structural Regulations;
l. Examiner: the person designated by the Examination Board to administer the interim examinations, in accordance with Article 7.12 of the Act;
m. EC: European Credits, i.e. the study load unit in accordance with the European Credit Transfer System;
n. Specialisation: a coherent programme within the Master's programme that has been approved as such by the faculty board;
o. Work day: Mondays to Fridays, with the exception of official holidays and any other days designated by Radboud University as collective holidays;
p. Awarding of the degree certificate: the formal confirmation that all the examination requirements have been met;
q. prospectus: the guide for a particular degree programme of the Faculty of Science, containing specific information regarding the Master's degree programme;
r. The university: Radboud University;
s. The faculty: The Faculty of Science;
t. The education institute: the organisational unit responsible for the degree programme;
u. Free elective: a freely-selected, academic, assessable component.
v. Rules and regulations: the rules in which the Examination Board explain how it works in accordance with the Education and Examination Regulations.

PART II GENERAL PART

Section 2. Admission to the degree programme and education

Article 2.1 Admission and admission requirements

1. Decisions regarding admission are made by the education institute on behalf of the Dean.
2. The programme-specific part of these EER lists the admission requirements the student must meet to be admitted to the degree programme.

Article 2.2 Language requirements

1. A sufficient command of the English language is required to participate in the programme and to sit for examinations in English. This requirement is met if the student:
   a. comes from one of the following countries: Australia, Canada (with the exception of Quebec), Ireland, New Zealand, Singapore, the United Kingdom, the United States, and South Africa; or
   b. is in possession of a pre-university education (VWO) diploma; or
   c. is in possession of a pre-university education diploma obtained at an English-language institution in the Netherlands or elsewhere; or
   d. has a pre-university education diploma obtained at a German secondary education institution, with English as *Grundkurs*; or
   e. has a Bachelor's diploma from a university of applied sciences (HBO); or
   f. has a Bachelor's diploma from a Dutch university; or
   g. in the opinion of the programme meets the requirements; or
   h. has achieved a sufficient score on one of the following English language tests:
      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 none of the sub-scores below 20;
      iii. the IELTS with a score of 6.5 or higher, where none of the sub-scores are below 6.0;
      iv. the Cambridge CAE or CPE with a score of C or higher.
2. A sufficient command of Dutch is required to participate in the programme and to sit for examinations 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.

   In certain cases, the education institute may assess whether a student is sufficiently proficient in Dutch.

Section 3. Structure and design

Article 3.1 Final examination, degree, and distinctions

1. The degree programme is concluded by the Master's final examination.
2. A student who has passed the final 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 the EC for their degree programme 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 can be found in Article 4.7 of these 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. Prepare for further study or 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 regarding the knowledge, understanding and skills that students are expected to possess upon successful completion.
2. The programme has research specialisations and societal specialisations. The specialisations are described in the programme-specific part.
3. 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 component to aid reflection on study performance, study planning, and professional orientation with a study load of 0 or 1 EC.
4. The elective courses cannot have a substantial overlap in content with courses from the mandatory or elective components of the programme. It is not possible to receive an exemption for the elective component based on a Bachelor's course.
5. The composition of the Master's programme compiled by the student must be presented for approval to the Examination Board no later than three months before the expected examination date. The Examination Board will decide whether to grant approval within a month of receiving the submitted programme.
6. A student can only participate in components provided by the Radboud Teachers Academy of Education after the disciplinary internship has been completed. A student can only participate in the Science, Management and Innovation final research project after the student has passed the thematic components and NWI-FMT019 Methods in Societal Research: Science, Management &

Innovation. A student can only participate in the Science in Society research project after 12 EC has been obtained from the SiS curriculum.

7. A student is permitted to add components to the examination programme. These components are considered extracurricular and do not count towards the determination of the distinction.
8. If a student can choose between components within the curriculum and the student has passed more than one of these components, then the student can decide which components will count towards their distinction.

Article 3.4 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 partial examination and may consist of the following assessment forms:
   a. Written test (paper or digital);
   b. Oral test;
   c. Presentation;
   d. Skill test;
   e. The creation of a discipline-specific product and/or assignment.
2. Prior to the commencement of the academic year, information will be provided in the prospectus for each individual component regarding the way in which the interim examinations will be administered. At the request of the student or the examiner, the Examination Board may allow an interim examination to be administered in a form other than stated above, if this is not to the detriment of the student.
3. In cases where an interim examination has admission requirements, the admission requirements will be published in the prospectus before the start of the academic year, see Article 3.3 paragraph 6. This requires the permission of the programme coordinator. Contrary to the above provisions, the admission requirements for the courses completed in the fourth period may still be changed up until the start of the second period, with the permission of the programme coordinator.
4. There are no admission requirements for an interim examination; if a student is enrolled in a component, they are admitted to all sub-components including the interim examination.
5. 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 requires certain facilities for their interim examinations or resits, they must request these from the Education and Examination Administration of the faculty no later than two weeks before the interim examination or resit.

6. During oral examinations, no more than one person is tested simultaneously, unless decided otherwise by the Examination Board.
7. An oral interim examination is not public, unless the Examination Board has deemed otherwise in exceptional cases. An audio recording is made of oral interim examinations. As an alternative to an audio recording, a second examiner or a designated observer may be present.

Article 3.5 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 completed a course in a relevant subject at a university or institute of higher vocational education (HBO);
   b. Demonstrates that they have adequate knowledge and skills regarding the component in question as a result of relevant work experience or professional experience.
2. If the degree programme allows group exemptions, then these are included in the programme-specific part of these regulations.
3. Only one grade for each course may be registered for a single degree programme. If a course is also part of another examination programme, this course will be listed on the diploma as an exemption.
4. Students who were first enrolled on or after 1 September 2017 can never have more exemptions, as stated in paragraph 1, than a quarter of the total study load of the programme expressed in EC.
5. All results for a degree programme achieved before the date of the first enrolment are stated as exemptions on the degree programme's diploma. These exemptions do not count towards the ECs as stated in paragraph 4 if the courses are only included in a one examination programme.
6. Exemptions as referred to in paragraphs 1 and 2 cannot be granted for final examination assignments.

Article 3.6 Term of validity for successfully completed interim examinations

1. The term of validity of successfully completed interim examinations is unlimited.
2. Results obtained for interim examinations are valid at least until the end of the academic year. The lecturer can decide to extend the term of the validity of the result obtained for a partial examination.

Article 3.7 Elective programme

The programme's Examination Board determines whether to grant permission for a student to take an elective programme as meant in Article 7.3d of the Act. The Examination Board will verify whether the

programme fits within the domain of the degree programme under the authority of the Examination Board, whether it is sufficiently cohesive, and whether the level is adequate in the context of the programme's exit qualifications.

Section 4. Testing

Article 4.1 Frequency of interim examinations

1. Students are given the opportunity to take the examinations at least twice per academic year per interim examination.
2. Contrary to the provisions of paragraph 1, a degree programme coordinator may decide to only offer one opportunity for an interim examination or partial examination. If only one opportunity is given to take an interim examination or partial examination, this is stated in the programme prospectus before the start of the academic year.
3. 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.
4. If a certain component is not given in a particular academic year, the opportunity to take the corresponding examination will be offered once in that academic year, as long as the interim examination is administered in written or oral form.

Article 4.2 Registration for course examinations

1. Students who register through OSIRIS for a component are also automatically registered for the first interim examination opportunity in the relevant academic year. This does not apply to students whose enrolment in the degree programme has not yet been completed.
2. Registration for an interim examination closes at 11:59 pm on the day preceding a period of five working days before the date of the interim examination, so that there are always five full working days between the deadline for registration for the interim examination in question and the date of that examination. The day on which the interim examination takes place is not included in this period of five working days.
3. A successfully passed examination may be taken again.
4. If a student resits an interim examination, the most recent result will determine the final result.

Article 4.3 Confirmation of examination results

1. The result of an interim examination is determined by an examiner in the form of a grade on a scale from 1 to 10 (with 10 as the highest possible grade), consisting exclusively of whole numbers

or half numbers. However, a grade of 5.5 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 “completed”, “not completed”, “satisfactory”, “not satisfactory”, and “good” may also be awarded.

2. Contrary to the provisions of paragraph 1, partial examinations may also be graded with one decimal point on a 10-point scale. Rounding off grades is done exclusively for the final grade.

Article 4.4 Publication of results

1. The examiner shall determine the result of a thesis within 15 working days after its submission via http://thesissubmission.science.ru.nl.
2. The examiner shall determine the result of an oral examination within two working days of the date that it was administered.
3. 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 must be at least 10 working days between the date of the publication of the result in Osiris and the date of the resit.
4. Contrary to the provisions in paragraph 3, the examiner shall determine the result of a written interim examination in the fourth period no later than nine days before the scheduled date of the corresponding resit. The examiner shall determine the result of a written resit examination in the fourth period within five working days of the date it was administered.
5. In special cases, the Examination Board may extend the term in which the result must be determined as referred to in paragraph 3 by a maximum of ten working days. This is not possible for interim examinations in the fourth period.
6. In this statement of the result of an interim examination, the student is also informed of their right of inspection, referred to in Article 4.5 as well as the right to appeal to the Examination Appeals Board.
7. 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 explanation

1. Within at least 30 working 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 they shall be granted a copy of their graded work at cost.

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. Inspection or explanation as referred to in paragraph 1 and 2 shall take place during at least one scheduled moment before the start of the interim examination. If the student demonstrates that they are or were unable to attend an inspection at a determined place and time due to force majeure, they may request the Examination Board to allow them another opportunity to inspect the examination, if possible within the period referred to in the first paragraph.
4. In all cases, the inspection must take place a minimum of five working days before the resit of an interim examination. For examinations in the fourth period, the student may view their work until one working day before the resit.
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 when 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 they have provided sufficient proof that they have passed the components leading up to the final examination.
2. Examinations are scheduled each month.
3. 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. The result of the examination is determined by the Examination Board within five weeks following the student’s request. If the examination took place in July, the results will be determined no later than 31 August. In relation to entry requirements for a subsequent programme or the acceptance of a job, if required, a statement can be provided within 5 days indicating that the student has met the requirements of the examination. This is only possible if the student has met the criteria specified in paragraph 1.
4. 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 assessments of all components with less than 20 EC is at least equal to an 8.0 and the weighted average result of the assessments of all components with 20 EC or more is at least equal to an 8.0.
   b. "summa cum laude" shall be awarded if the weighted average result of assessments of all components with less than 20 EC is equal to an 9.0 and the weighted average result of the assessments of all 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 from 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 stipulated otherwise in the programme-specific part of these regulations.
5. The distinction shall not be awarded if more than 10 percent 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.

Section 5. Study performance, guidance, and evaluation of education

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 programme within a reasonable timeframe.
2. The dean is responsible for providing adequate student counselling.

Article 5.2 Method of evaluation of education

In compliance with the quality assurance system of the university as described in the Handboek Kwaliteitszorg Onderwijs Radboud Universiteit (Radboud University quality assurance manual), the dean shall ensure that the education of the degree programmes is systematically evaluated.

PART III PROGRAMME-SPECIFIC PART

Section 6. Admission to the degree programme and education

Article 6.1 Admission requirements

Admission requirements for the programme:

a. Students must have successfully passed the final examination of the Bachelor's programme in Mathematics at Radboud University.
b. Students must have successfully passed the final examination of the Bachelor's programme in (Technical) Mathematics at Radboud University or an equivalent degree at another Dutch university.
c. Students must have successfully completed the final examination of the Bachelor's programme in Physics and Astronomy at Radboud University with the following Mathematics courses: NWI-WP029 Inleiding Wiskunde, NWI-WP030 Groepentheorie, NWI-NP028 Lineaire Algebra B, NWI-WP001B Analyse 1, NWI-WB001B Analyse 2, NWI-WB012B Ringen en Lichamen, NWI-WB003F Gewone Differentiaalvergelijkingen+Numerieke Methoden/NWI-WB104 Gewone Differentiaalvergelijkingen, and NWI-WB104 Topologie.
d. Students must be in possession of a degree certificate that is at least equivalent to the degrees referred to in paragraphs a, b, and c.
e. Students must have demonstrated suitability for participation in the degree programme, in the opinion of the Examination Board.
f. Students meeting the requirements mentioned under d. or e. must provide proof of sufficient proficiency in English, as described in Article 2.2.

Section 7. Structure and design

Article 7.1 Programme-specific learning outcomes

Graduates of the Master's Programme in Mathematics will have the achieved the following learning outcomes:

a. Graduates have acquired knowledge, skills and insights in the area of mathematics that enable them to independently carry out their profession and qualify for advanced programmes as researchers and designers.
b. Graduates have acquired specialist knowledge and insight in at least one sub-specialisation of mathematics.
c. Additionally, graduates have acquired specialist knowledge of another sub-specialisation of mathematics, or of a mathematics-related topic outside the field of mathematics.
d. Graduates are able to acquire independent insight into new developments in their field.
e. Graduates have learned to independently solve complicated problems and formulate solutions, while simultaneously critically assessing established scientific insights.
f. Graduates possess adequate computer and computing skills.
g. Graduates can acquire new knowledge in the area of mathematics and integrate this into their existing knowledge. In doing so, they possess the learning skill to orientate themselves at the level of a specialist in a sub-specialisation of mathematics outside their chosen specialisation.
h. Graduates are able to communicate with their peers on scientific knowledge, both at a basic and specialised level. Graduates are also able to hold oral presentations and write clear articles on research that they have conducted, also for a general non-specialist audience. Graduates can prepare both oral and written reports and can debate scientific topics.

i. Graduates possess sufficient knowledge and insight into the role of mathematics in society to enable them to perform satisfactorily in their future positions and to reflect on social and ethical problems.
j. Graduates have demonstrated, by completing a thesis, the ability to independently develop or apply mathematics at a sufficient standard or to apply it in context.

Specific qualifications that are gained through the different specialisations:

Research specialisation Interactive Mathematics" (as described in Article 7.2a):

a. Graduates have a broad and in-depth overview of the main theme of the Master's specialisation, and profound knowledge of capita selecta in connection to the subject of the Master's thesis.
b. Graduates are able to independently inform themselves of developments in Mathematics by a review of literature.
c. Graduates are able to formulate new research questions and hypotheses in the field of Mathematics, and to select suitable techniques and research methods to answer these questions.

Specialisation "Science, Management and Innovation" (as described in Article 7.2b):
Graduates are:

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 are able to apply a range of approaches to address these and to 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.
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.

Specialisation "Science in Society" (as described in Article 7.2c):
Graduates are:

a. capable of analysing 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 analysing, 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

Specialisation "Science and Education" (as described in Article 7.2d):
Graduates:

a. have knowledge of and insight into the theoretical principles of discipline-specific thinking, educational design, and the methods and techniques of applying didactic research in the discipline;
b. are able to design, implement and systematically evaluate an educational design and a scientific study, drawing a link between didactic and professional practice concepts, discipline-specific thinking of the students at different levels and problems from teaching practice;
c. are able to devote attention to discipline-specific learning of individual and unique students, and focus on developing inspiring education;
d. are able to apply thorough scientific knowledge on general didactic concepts about the learning of individual students and on methods to improve both the social climate in the classroom and to answer the individual learning needs of the students;
e. are able to act in a differentiated way and improve the social climate for collaboration and, in doing so, set independent priorities and, after consultation with relevant third parties, respond appropriately to development and behavioural problems;
f. focus on collaboration and responsible behaviour based on clear communication with individual students and colleagues, on the basis of a personal vision;
g. are able to develop a personal professional knowledge base to justify their own actions and understand the actions of colleagues and supervisors;
h. are able to use the professional knowledge base and contextual feedback (students, colleagues, supervisors) to evaluate and guide their own professional development;
i. are able to develop a personal identity in the context of their own actions, external frameworks and ethical dilemmas.

Article 7.2 Composition of the programme

Subject to the provisions in Part II of these regulations, the student chooses one of the following specialisations of the degree programme:

1. Interactive Mathematics
2. Science, Management and Innovation
3. Science in Society
4. Science and Education

Article 7.2a Interactive Mathematics

The Master's programme in Mathematics with the research specialisation Interactive Mathematics consists of the following components:

1. Major (30 EC)

A choice needs to be made from one of the following majors with at least 30 EC. Courses with "MasterMath" as a course code are not taught at Radboud University, but are provided in collaboration with MasterMath. They can be found on the website of MasterMath (https://elo.mastermath.nl/).

a. Major: Foundations

Mandatory selection (30 EC) from the following courses:

	Course code	Course name	EC
1	NWI-WM150 NWI-WM144	Category Theory and Homological Algebra, or: Calculus of Variations	6 6
2	MasterMath MasterMath	Differential Geometry, or: Algebraic Geometry 1.	8 8
3	MasterMath MasterMath	Lie Groups, or: Lie Algebras	8 8
4	NWI-WM094B MasterMath MasterMath	Algebraic Topology 1 Algebraic Topology 1, or: Partial Differential Equations	6 8 8
5	MasterMath MasterMath	Riemann Surfaces, or: Elliptic Curves	8 8
6	MasterMath NWI-WM068C	Operator Algebras, or: Non-commutative Geometry	8 6
7	MasterMath MasterMath NWI-WM139	Algebraic Number Theory, or: Algebraic Number Theory, or: Analytic Methods in Number Theory	8 8 6

b. Major: Applications

Mandatory selection (30 EC) from the following courses:

	Course code	Course name	EC
1	NWI-WM144 NWI-WM160	Calculus of Variations, or: Gamma-Convergence	6 6
2	MasterMath MasterMath MasterMath	Partial Differential Equations, or: Measure Theoretic Probability, or: Numerical Linear Algebra	8 8 8
3	NWI-WM126 NWI-WM098B	Biostatistics, or: Regression Analysis and Non-Parametric Statistics	6 6
4	MasterMath MasterMath MasterMath	Mathematical Biology, or: Asymptotic Statistics, or: Numerical Bifurcation Analysis of Large-scale Systems	8 8 8

5	NWI-WM151 NWI-WM161	Stochastic Simulation, or: Monte Carlo Methods	6 6
6	NWI-WM152 MasterMath	Martingales and Large Deviations, or: Probabilistic and Extremal Combinatorics	6 8
7	NWI-WM153 NWI-WM156	Nonlinear Wave Equations, or: Introduction to Finite Elements	6 6

c. Major: Mathematics and Computation

Mandatory selection (30 EC) from the following courses:

	Course code	Course name	EC
1	NWI-WM069B	Computer Algebra	6
2	NWI-WM072B	Complexity Theory	6
3	NWI-WM120C MasterMath	Computability Theory, or: Computability Theory	6 8
4	MasterMath	Probabilistic and Extremal Combinatorics	8
5	NWI-WM150	Category Theory and Homological Algebra	6
6	NWI-IMC010	Type Theory and Coq	6
7	NWI-IMC011	Semantics and Domain Theory	6
8	NWI-WM156	Introduction to Finite Elements	6
9	NWI-WM158	Experimental Mathematics	6

d. Major: Gravity+ Synergy

Compulsory components (18 EC):

Course code	Course name	EC
NWI-WM115B	Master Seminar	3
NWI-NM124	Gravity+ Seminar	3
NWI-NM0107	General Relativity	6
NWI-NM018B	Singularities and Black Holes	6

Mandatory selection (12 EC) from the following courses:

Course code	Course name	EC
NWI-WM115B	Non-linear Wave Equations	6
NWI-NM124	Calculus of Variations	6

NWI-NM0107	Non-commutative Geometry	6
MasterMath	Riemann Surfaces	8
MasterMath	Differential Geometry	8

2. Compulsory components (7 EC)

Course code	Course name	EC
NWI-WM115C	Master Seminar*	6
NWI-NM019B	Professional Preparation	1

*Students who choose the major Mathematics and Computation may replace this by NWI-WM115B Master Seminar (3 EC) + NWI-IMC049 MFoCS Seminar (3 EC).

* Not compulsory for students who choose the major Gravity+ Synergy (NWI-WM115B Master Seminar (3 EC) +NWI-NM124 Gravity+ Seminar (3 EC) are compulsory for the major).

3. Mathematical electives (20 EC)

The students must take 20 EC of mathematics courses at the Master's level. This package must be presented to the Examination Board for approval.

4. Master electives (14 EC)

The students must take 14 EC of courses at the Master's level, within or outside the field of mathematics. This package must be presented to the Examination Board for approval.

5. Philosophical component (3 EC)

Course code	Course name	EC
NWI-WM040B	Philosophy of Mathematics	3
NWI-FFIL300C	Philosophy of Mathematical Practice	3

6. Free space for electives (6 EC)

7. Graduation phase (40 EC)

In line with the major, consisting of conducting a literature study, writing a thesis and making a final presentation. The thesis can consist of an internship report. Research or internships may be completed outside of the Mathematics department, but the first assessor needs to be from the department. A plan needs to be drafted in consultation with the first assessor prior to commencement of the research or internship.

Article 7.2b Science, Management and Innovation

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

1. Major (24 EC)

A choice needs to be made from one of the majors of at least 24 EC, as described in Article 7.2a point 1.

2. Mathematical electives (23 EC)

The students must take 23 EC of mathematics courses at the Master's level. This course package must be presented to the Examination Board for approval.

3. Compulsory components (7 EC)

Course code	Course name	EC
NWI-WM115C	Master Seminar*	6
NWI-NM019B	Professional Preparation	1

*Students who choose the major Mathematics and Computation may replace NWI-WM115B Master Seminar (6 EC) by WM115B Master Seminar (3 EC- + NWI-IMC049 MFoCS Seminar (3 EC).

4. Philosophical component (3 EC)

Course code	Course name	EC
NWI-WM040B	Philosophy of Mathematics	3
NWI-FFIL300C	Philosophy of Mathematical Practice	3

5. Free space for electives (6 EC)

6. Specialisation (57 EC)

a. Compulsory courses (15 EC)

Course code	Course name	EC
NWI-FMT003E	Innovation Management	6
NWI-FMT0234	Policy and Economics	3
NWI-FMT006A	Entrepreneurship: Making a Business Plan	3
NWI-FMT019	Methods in Societal Research: Science, Management & Innovation	3

b. Theme courses (12 EC)

Choice of one of the themes: Climate and Energy or Health.

Climate and Energy

Course code	Course name	EC
NWI-FMT022	Energy and Climate	6
NWI-FMT026	Energy Modelling	3
NWI-MM020A	Environmental Life Cycle Assessment	3

Health

Course code	Course name	EC
NWI-FMT023	The Future of Health	6
NWI-FMT029	How Health Systems Work	6

c. Science, Management and Innovation final research project (30 EC)

The SMI research project may, in consultation with the coordinator or a lecturer from the SMI specialisation, be completed both internally (at the Faculty of Science) or externally (government, businesses, consulting firms, NGOs, etc.), at home or abroad. In the first month, the student will write a research plan which must be approved by both the external and first supervisor as well as the second reader. Of the latter two, at least one is from the Mathematics department. The assessment of the thesis is based on the criteria described in the manual *"Doing a research project: A guide for students of the Science, Management & Innovation Master's specialisation"*.

Article 7.2c Science in Society

The Master's programme in Mathematics with the specialisation science in Society consists of the following components:

1. Major (24 EC)

A choice needs to be made from one of the majors of at least 24 EC, as outlined in Article 7.2a point 1.

2. Mathematical electives (23 EC)

The students must take 23 EC of mathematics courses at the Master's level. This course package must be presented to the Examination Board for approval.

3. Compulsory components (7 EC)

Course code	Course name	EC
NWI-WM115C	Master Seminar	6

NWI-NM019B	Professional Preparation	1

4. Philosophical component (3 EC)

Course code	Course name	EC
NWI-WM040B	Philosophy of Mathematics	3
NWI-FFIL300C	Philosophy of Mathematical Practice	3

5. Free space for electives (6 EC)

6. Specialisation (57 EC)

a. Compulsory courses (24 EC)

Course code	Course name	EC
NWI-FC002B	Science and Societal Interaction	3
NWI-FC003B	Research, Responsibility and Uncertainty	3
NWI-FC0010D	Framing Knowledge	6
NWI-FC0013C	Science and Media	3
NWI-FC0043B	Science and Public Policy	3
NWI-FC0044C	Methods of Societal Research: Science in Society	6

b. Limited choice electives (3 EC)

To be filled with components related to the topic of the thesis. These components must be presented for approval to the SiS coordinator.

c. Science in Society internship and report (30 EC).

In consultation with a SiS lecturer, the SiS graduation project can be completed both internally (at the ISIS department) or external (government, consulting firms, NGOs, etc.). In the first month, the student will write a research plan which must be approved by both the first supervisor as well as a second reader. Of the latter two, at least one is from the Mathematics department. The assessment of the thesis is based on the criteria described in the *"Graduation project guidelines SiS"*.

Article 7.2d Science and Education

1. Compulsory components (100 EC)

Course code	Course name	EC
RDA-MA2-01	Visie op het schoolvak, wetenschapsgebied en onderwijs	3
RDA-MA2-02	Leren en instructie 1: De les vanuit verschillende leertheorien	2
RDA-MA2-03	Persoonlijk leiderschap van de docent en professioneel spreken	1
RDA-MA2-04	Leren en instructie 2: Lessen in samenhang en activeren	2
RDA-MA2-06	Adolescentiepsychologie: de leerling centraal in het pedagogisch handelen van leraren	3
RDA-MA2-21	Leren en instructie 3: Leermoeilijkheden en differentiatie	3
RDA-MA2-08	Klassenmanagement: op weg naar een veilig en stimulerend leerklimaat	2
RDA-MA2-13	Leren en instructie 4: Denken in het schoolvak	4
RDA-MA2-16	Teacher Leadership	4
RDA-MA2-09	Internship	7
RDA-MA2-10	Internship 2	7
RDA-MA2-11	Internship 3	8
RDA-MA2-12	Internship 4	8
NWI-WM157	Statistics in Society	6
??	Rode draad	4
??	Rode draad	4
NWI-EDU02	Methoden van Onderzoek	6
NWI-WM…	Geschiedenis en Grondslagen van de Wiskunde	6
NWI-EDU03	Geïntegreerd masteronderzoek	20

2. RDA electives (2 EC)

3. Mathematics elective course (18 EC)

Free selection from the Mathematics Master's course.

This is the curriculum for students who started the programme before the 2020-2021 academic year: The Master's programme in Mathematics with a Science and Education specialisation consists of the following components:

1. Mathematical electives (44 EC)

The students must take 44 EC of mathematics courses at the Master's level. This course package must be presented to the Examination Board for approval.

2. Compulsory components (7 EC)

Course code	Course name	EC
NWI-WM115C	Master Seminar	6
NWI-NM019B	Professional Preparation	1

3. Philosophical component (3 EC)

Course code	Course name	EC
NWI-WM040B	Philosophy of Mathematics	3
NWI-FFIL300C	Philosophy of Mathematical Practice	3

4. Free space for electives (6 EC)

5. Specialisation (60 EC)

The Science and Education specialisation 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 Teachers Academy. 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 and/or components from the SiS or SMI programme as referred to in Articles 7.2b and 7.2c.

Article 7.3 Deviating programme

If a student does not choose a specialisation, they must submit a motivated request for permission to the Examination Board for an alternative major selection before the start of the Master's programme.

Article 7.4 Additional requirements

The Master's degree programme content chosen by the student may, after prior permission from the Examination Board, contain a maximum of 12 EC of courses from the Bachelor's programme in Mathematics. This may exclusively consist of third year courses that have not been part of the student's Bachelor's programme.

Section 8. Transitional provisions

- NWI-WM115C Master Seminar (6 EC) may be replaced by NWI-WM115B Master Seminar (3 EC), provided it was followed in 2017-2018 or earlier.
- Students who started the Master's in Mathematics degree programme before 1 September 2020 may choose from the specialisations as outlined in the EER of their starting year or from the EER 2020-2021.
- Students who started the Master Mathematics before 1 September 2020 may choose the following courses as part of the major Applications: NWI-WM154 Numerical Methods for PDE (6EC), NWI-WM098B Regression Analysis and Non-Parametric Statistics (6EC) en NWI-WM126 Biostatistics (6EC).
- Students who started the Master's in Mathematics before 1 September 2020, may replace the following compulsory components from Article 7.2d point 1 by mathematic electives: Geïntegreerd masteronderzoek (NWI-EDU02, 20 EC), Statistics in Society (NWI-WM157, 6 EC), Geschiedenis en Grondslagen van de Wiskunde (NWI-WB019C, 6 EC).

- For students of Science, Management and Innovation, the following applies:
    - NWI-FMT020 Bio-economy may be used instead of one of the 3 EC courses in the Climate and Energy theme.
    - NWI-FMT025B From Lab to Clinic may be used instead of NWI-FMT029 How Health Systems Work.

PART IV FINAL PROVISIONS

Section 9. Final provisions

Article 9.1 Safety net scheme and hardship clause

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

Article 9.2 Establishment and amendments

1. Contrary to 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 the approval of the Joint Assembly of the faculty.
2. An amendment to these regulations has no impact on the current academic year, unless this would disproportionately damage the interest of the students.
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 enter into force on 1 September 2020.

Article 9.4 Publication

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

As established by the dean on 15 July 2020.

APPENDIX I REGULATIONS ON FRAUD DURING INTERIM EXAMINATIONS AND EXAMINATIONS

Paragraph 1 Introductory provisions

Article 1. Purpose of these regulations

1. To prevent fraud during interim examinations and examinations as referred to in article 7.12b *WHW,* the executive board of Radboud University (hereinafter: RU) adopts the following regulations.

2. For the harmonization of the provisions in these regulations between faculties, these regulations have been laid down as 'comply-explain' regulations (*pas-toe-leg-uit-regeling).*

Article 2. Scope of these regulations

1. Except for the provisions referred to in this appendix, these regulations apply both to the initial RU programmes and for the students who have registered for these programmes.

2. The executive board may decide, in a separate decision, to apply these regulations *mutatis mutandis* to other programmes offered by RU.

Article 3. Definitions

The terms that are used in these regulations – in so far as these terms are also used in the Higher Education and Research Act (*Wet op het Hoger onderwijs en Wetenschappelijk onderzoek (*hereinafter: WHW) – have the same meaning that is given to these terms in the WHW.

Paragraph 2 Definition fraud, procedure and sanctions

Article 4. Definition of fraud

1. At RU, fraud is understood to mean any act or omission by student which, in its nature, is intended to have as an effect that proper assessment of the knowledge, understanding and skills of that student, or another student, is made fully or partially impossible.
2. Fraud is in any case understood to mean:
   a. fraud when taking written interim examinations, including
      i. having materials available which are not permitted under the House Rules Examinations Rooms RU Regulations (*Regeling Huisregels Tentamenruimten RU);*
      ii. copying or exchanging information;

iii. passing oneself off as someone else, or being represented by someone else during interim examinations;

b. fraud when producing theses and other papers, including
   i. plagiarism in the sense of using or copying someone else's texts, data or ideas without complete and correct source references, plagiarism in the sense of copying the work of another student and presenting this as one's own work and other specifically academic forms of plagiarism;
   ii. fabricating (making up) and/or falsifying (distorting) research data;
   iii. submitting a thesis or another paper that was written by someone else.

c. Other fraud in the context of interim examinations or examinations, including
   i. taking possession of assignments, answer keys and the like, prior to the time the interim examination or examination.

3. An attempt to commit fraud will also be seen as fraud for the purpose of these regulations.

Article 5. Procedure for suspicion of fraud

1. When fraud is suspected, the board of examiners or the examiner immediately informs the student of this suspicion. If the suspicion of fraud is established when the interim examination or the examination is administered, the board of examiners or the examiner will allow the student to complete the interim examination or the examination.

2. The board of examiners or the examiner may order the student to make any material related to the suspicion of fraud available to them.

3. The board of examiners or the examiner may order the student to make any material related to the suspicion of fraud available to them.

4. For the purposes of the provisions in paragraphs 1 and 2 of the present article, examiner is also understood to mean the invigilator or any other RU member or staff.

Article 6. Procedure for investigation and determination of fraud

1. The board of examiners makes the report referred to in article 5 available for the student without delay and then starts an investigation into the matter. The board of examiners provides the student with the opportunity to respond to the report in writing. The board of examiners hears both the examiner and the student.

2. Within four weeks following the date the report was made available to the student, the board of examiners decides whether fraud was actually committed. The board of examiners informs both the student and the examiner of their decision in writing. The four-week period may be extended by two weeks.

3. If fraud is established, the board of examiners declares the relevant interim examination or examination invalid.

4. If fraud is established, the board of examiners records both the fact that fraud was committed and the sanction imposed in the student's student file.

Article 7. Sanctions

1. If the board of examiners has established fraud has been committed, the board of examiners may:
   a. determine that the student may not sit one or more interim examinations or examinations during a period to be set by the board of examiners, which period will be a maximum of one year;
   b. determine that no distinction will be awarded on the degree certificate;
   c. make a recommendation to the Dean of the Honours Academy that the student should not be admitted to the honours programme of the university or the faculty should be ended.

   If the board of examiners has established that *serious* fraud has been committed, the board of examiners may also

   d. make a recommendation to the executive board that the student's registration for a programme should be terminated with definitive effect.

2. After the board of examiners has established that serious fraud has been committed, the executive board – upon the board of examiners' recommendation – may terminate the the student's registration for a programme with definitive effect.
3. The sanctions as referred to in this article are imposed as from the day following the date the student is notified of the decision that sanctions are imposed.

Paragraph 3 Transitional provisions

[no transitory regulations]

Paragraph 4 Final provisions

Article 8.

1. Decisions pursuant to these regulations may be sent to the student digitally and/or by email.
2. The student can appeal against any decision made under these regulations, within six weeks following the date on the relevant decision, by lodging a notice of appeal at the Examinations Appeals Board (*College voor Beroep van de Examens (CBE).*

Article 9. Adoption and amendment

1. These regulations have been adopted by the executive board in accordance with the 'comply-explain' principle.

2. In so far as the content of these regulations relates to the duties and powers of the faculty's dean or the duties and powers of the programme's board of examiners, the content must also be confirmed by that dean of that board of examiners. Without any comments by the dean or the board of examiners as referred to in the first paragraph of the present article, confirmation will take place five months after the regulations have been adopted.

Article 10. Effect

With due observance of the provisions in article 9, these regulations take effect on 1 September 2018. These regulations will then replace any previous regulations.

Article 11. Publication

1. The executive board sees to the appropriate publication and possible amendments of these regulations.

2. For the purpose of appropriate and clear provision of information to students and prospect students, the dean and the board of examiners will include these regulations, every year, as an appendix to the Education and Examination (*Onderwijs- en Examenreglement (OER)*) and as an appendix to the Rules and Guidelines (*Regels en Richtlijnen (RR))* of the programme.

Thus adopted by the executive board on 13 November 2017.