EDUCATION AND EXAMINATION REGULATIONS

of the Master's Degrees in

Biological Sciences
Biomedical Sciences
Biosciences
Chemical Sciences
Health Sciences
Neuroscience and Cognition
Pharmaceutical Sciences
Science and Business

at the Graduate School of Life Sciences, Utrecht University

2018 - 2019

Content

These Education and Examination Regulations contain the programme-specific rights and obligations of students, on the one hand, and Utrecht University, on the other. The general University Students' Charter contains the rights and duties that apply to all students. For the Master's degree in Health Sciences a different Charter applies.
These regulations are duly adopted by the dean on August 28th 2018, with consent from the Faculty Councils.

SECTION 1 – GENERAL PROVISIONS

1.1 – Applicability of the Regulations

These regulations apply to the education, tests and the examination of the Master's programmes in the Life Sciences, of the Master's degrees in the Biological Sciences, Biomedical Sciences, Biosciences[1], Chemical Sciences[2], Health Sciences, Neuroscience and Cognition, Pharmaceutical Sciences, and Science and Business (hereinafter referred to as 'the Master's degrees') and to all students who are registered for the Master's degrees in the academic year 2018-2019 and to all candidates who request to be admitted to a Master's programme of the GS-LS.
The Master's degrees are provided by the Utrecht Graduate School of Life Sciences within the Faculties of Medicine, Veterinary Medicine, and Science, hereinafter referred to as 'the School' and 'the Faculties'.

1.2 – Definition of terms

In these regulations, the terms below are defined as follows:

a. the Act: the Dutch Higher Education and Research Act (*Wet op het hoger onderwijs en wetenschappelijk onderzoek*);
b. student: anyone who is registered at the university to take courses and/or to sit interim examinations and the examinations of the Master's degree;
c. credit: unit expressed according to the European Credit Transfer System (ECTS), whereby one credit (European Credit, EC) is equal to 28 hours of study;
d. language code of conduct: the rules of conduct relating to academic programmes and examinations in languages other than Dutch, determined by the Executive Board on the basis of Section 7(2)(c) of the Higher Education and Research Act (*Wet op het hoger onderwijs en wetenschappelijk onderzoek*);
e. degree: the Master's degree referred to in section 1.1 of these regulations. A Master's degree can consist of several Master's programmes.
f. Master's programme: a coherent whole of components of study, within a Master's degree, as described in article 3.6 of these regulations;
g. study component: the entire teaching and assessment of a unit of study (e.g. a course or research project) of the study programme, included in the university course catalogue;
h. test: interim examination as referred to in section 7.10 of the Act;
i. examination: the final Master's examination of the study programme that is passed if all obligations of the entire Master's Degree Programme have been fulfilled;
j. University Course Catalogue: register of courses provided by Utrecht university, under responsibility of the Executive board (College van bestuur).
k. Educational Facilities Contract: the contract concluded by the education director (or another officer on behalf of the study programme) and the disabled student, which lays down the necessary and reasonable facilities to which the student is entitled;
l. International Diploma Supplement: the appendix to the Bachelor's degree certificate, which includes an explanation of the nature and contents of the study programme (partly in an international context);
m. Dean: the deans of the faculties;
n. Board of Studies: the directors of the School;
o. Board of Admissions: the committee which is responsible for the admission of applicants to the Master's degrees and Master's programmes;
p. programme committee: the members of the academic staff teaching in a Master's programme and responsible for the Master's programme;
q. programme coordinator: the member of the programme committee who is the liaison between the programme committee and the student;
r. Board of Examiners: the examiners for all Master's programmes of the School;

[1] Start from September 2018
[2] Programmes Molecular and Cellular Life Sciences and Drug Innovation only.

s. study guide: study guide for all Master's programme's within the School.
t. Research project coordinator: the staff that coordinate the procedures of the research projects and the writing assignments on behalf of the School.

The other terms have the meanings ascribed to them by the Act.

SECTION 2 – ADMISSION

2.1 – Requirements for admission to a Master's degree programme

1. The holder of a Dutch or foreign degree who demonstrates knowledge, insight and skills in the field of life sciences at the level of a University Bachelor's[3] degree is eligible for admission to the Master's degree.
2. In addition to the provisions of article 2.1, paragraph 1, the following requirements apply for admission to the Master's programmes specified (the level of required knowledge must be equivalent to the advanced level of the Bachelor of Science degree[4] of Utrecht University):
   - Applied Data Science: the student must have knowledge in the field of life and/or natural sciences and statistics, have a strong interest in application of data science and have relevant working experience;
   - Bio Inspired Innovation: the student must have knowledge in the field of life and/or natural sciences and have a strong interest in sustainable development, design and innovation;
   - Biofabrication[5]: the student must have knowledge and skills in biomedical techniques and/or technologies and a broad interest in approaches from technical innovation (e.g. biomaterials and bioreactors);
   - Biology of Disease: the student must have knowledge of the pathology and (patho)physiology of organs and organ systems;
   - Cancer, Stem Cells and Developmental Biology: the student must have thorough basic knowledge of molecular biology, cell biology, metabolism and signal transduction;
   - Drug Innovation: the student must have knowledge of pharmacology, (patho)physiology, biochemistry, biotechnology and analytical and organic chemistry;
   - Environmental Biology: the student must have knowledge of ecological, physiological, or molecular aspects of plant biology, marine biology, microbiology and/or behavioural biology;
   - Epidemiology: the student must have knowledge of basic medical terminology, explicit interest in (applied) biomedical research and affinity with one of the domains of specialisation and must also have a minimum international B-level for quantitative courses in their pre-education (mathematics, statistics, epidemiology);
   - Epidemiology Postgraduate: the student must have knowledge of basic medical terminology, explicit interest in (applied) biomedical research and affinity with one of the domains of specialisation, and must have high grades (minimum international B-level) for quantitative courses in their pre-education (mathematics, statistics, epidemiology);
   - Infection and Immunity: the student must have knowledge of molecular cell biology, immunology and microbiology;
   - Medical Imaging: the student must have knowledge in the field of natural and/or physical sciences (e.g. mathematics, physics, computer science, or more applied technical sciences like biomedical engineering) and an interest in (bio)medical technology and science;
   - Molecular and Cellular Life Sciences; the student must have knowledge of structural and/or molecular biology and/or systems biology, the main life processes (such as development, metabolism, reproduction) and a broad interest in advances from genetics, theoretical biology and computer science;
   - Neuroscience and Cognition: the student must have knowledge of neuroscience and/or cognition;
   - One Health: the student must have basic knowledge about biomedical concepts such as infectious diseases, epidemiology, microbiology and ecology;
   - Regenerative Medicine and Technology[6]: the student must have knowledge and skills in biomedical techniques and/or technologies and a broad interest in approaches from technical innovation (e.g. biomaterials and bioreactors);

[3] The postgraduate Master's programme Health Sciences requires the level of a University Master's degree.
[4] Applied Data Science and Epidemiology Postgraduate require the level of a University Master's degree.
[5] The Master's programme Biofabrication is a collaboration with Queensland University of Technology (Australia), the University of Wollongong (Australia) and Wuerzburg University (Germany).
[6] The Master's programme Regenerative Medicine and Technology is a collaboration with Eindhoven University of Technology.

- Science and Business Management: the student must have knowledge in the field of life and/or natural sciences and have a strong interest in business management;
- Toxicology and Environmental Health: the student must have knowledge of toxicology and epidemiology.

3. Students will be selected on the basis of an assessment of the following core competencies of all concerned:
    a. motivation and talent (also based on an average grade, grading tables and/or GPA and study progress);
    b. level of required knowledge and the mastery of methods and techniques used in the subject area;[7]
    c. general high level of professional and intellectual ability;
    d. command of the language(s) used in the programme.

2.2 – English language

1. Registration is possible only after fulfilling the requirement of sufficient command of the English language.
2. Candidates have sufficient command of the English language if they:
    - hold a Bachelor degree from a Dutch university
    - hold a Bachelor degree from an English programme
    - are a native English speaker
    - hold a Dutch HBO diploma
3. If a candidate does not meet the requirements referred to in clause 2, this can be made up before the start of the study programme by sitting one of the following tests:
    - IELTS (International English Language Testing System). The minimum required IELTS score (overall band) must be: 6.5, with at least 6.0 for the 'writing' component.
    - TOEFL (Test of English as a Foreign Language). The minimum required TOEFL score is 93 for the internet test:
    - Cambridge EFL (English as a Foreign Language) examinations, with one of the following certificates:
        - Cambridge Certificate in Advanced English; minimum score: B;
        - Cambridge Certificate of Proficiency in English; minimum score: C.

2.3 – Admission procedure

1. Admission to a Master's degree and Master's programme is bestowed by the Board of Admissions. Admission decisions are made by the Board of Admissions, after consulting the programme committee.
2. In order to determine eligibility for admission to a Master's programme, the Board of Admissions will carefully consider and evaluate the level of knowledge, insight and skills of the applicant. The committee may ask experts within or outside the university to assess the applicant's knowledge, insight and skills in particular areas, in addition to reviewing written documents of qualifications gained.
3. In order to determine eligibility for admission to a Master's programme, the Board of Admissions will check whether the applicant meets the requirements referred to in articles 2.1, clause 1 and 2, or will have fulfilled them by the deadline date. In its evaluation the committee will consider the competences mentioned in art 2.1, clause 3, as well as the applicant's command of the English language. Based on this, the Board of admission will assess whether the candidate is able to achieve the Master's degree qualification within the prescribed period when demonstrating sufficient commitment.
4. The admission test is administered once or twice a year (see art. 3.5.2).
5. Applications for admission to a Master's programme should be submitted to the Board of Admissions before 1 April (for Master's programmes starting on 1 September) or before 1 September (for Master's programmes starting on 1 February) for students holding a foreign degree. Later deadlines may apply to holders of Dutch degrees. Requests submitted after this closing date will not be considered. The decision not to consider the request will point out the possibility to appeal to the Examinations Appeals Board.
6. Contrary to the provisions of paragraph 5, in special cases the Board of Admissions may handle a request submitted after these closing dates.
7. The Board of Admissions will strive to make a decision within a period of 20 working days from the date of receipt of the complete file. For programmes with a fixed capacity, this is within a period of 30 business days after the deadline (see appendix under 1). Admission will be

[7] If there is a deficiency, the student may be required to use (part of) the elective component to correct the deficiency (see also art. 3.6.4).

granted on the condition that by the starting date of the Master's programme, the applicant will have satisfied the knowledge and skills requirements referred to in 2.1, as evidenced by qualifications obtained.

8. The Board of Admission may decide to admit an applicant, who is preparing for the final examination of the bachelor's degree programme provided by Utrecht University, into a programme for two weeks at that applicant's request, provided that:
    - the students already received a conditional letter of acceptance
    - the aforementioned examination only depends on the test results of those units which are still being assessed by the relevant examiner(s);
    - there are grounds to expect that a pass will be obtained for the aforementioned examination

    Once a pass is obtained for the aforementioned examination, the admission will become final. If the student does not pass the final examination for the bachelor's degree programme within two weeks, he/she will be excluded from further participation in the master's degree programme until the aforementioned examination has been passed.
9. The applicant will receive written notification that he/she has been admitted to the degree and to a particular Master's programme. The possibility to appeal to the Examinations Appeals Board is pointed out in this notification.

2.4 – conditional admission decision: Pre-Master

1. If the outcome of the evaluation referred to in Article 2.3, paragraph 2, into the knowledge, insights and skills of the candidate is that the candidate does not yet meet the admission requirements referred to in art. 2.1, but will meet them after having passed a pre-master course tailored to the Master's degree programme, the candidate will be given a conditional admission decision.
   Only the Master's programmes Bio Inspired Innovation, Drug Innovation, Environmental Biology and Science and Business Management provide pre-master courses.
2. This conditional admission decision will state that the candidate concerned will be admitted to the Master's Programme if:
   a. the pre-master course with the courses described therein and the study load, expressed in credits, has been passed
   b. within the period stated in the admission decision.
3. The candidate will receive written confirmation of the conditional admission decision, which will point out the possibility to appeal to the Examinations Appeals Board.
4. After the conditions referred to in paragraph 2 (a) and (b) have been met, the conditional admission decision will be converted into a definitive admission decision.
5. After the expiry of the period referred to in paragraph 2(b), the student may no longer participate, or participate again, in the pre-master course of Utrecht University.
6. If insufficient progress is made in the pre-master course or if performance is qualitatively or quantitatively unsatisfactory, the Board of Studies of the Graduate School can exclude the student from further participation in the pre-master.
7. The pre-master course referred to in paragraph 1 is open only to candidates who:
   - hold the nationality of an EU/EER member state or Switzerland, or do not hold this nationality but do hold a residence permit that entitles them to statutory tuition fees, and
   - have completed their previous education in the Netherlands.
8. The Admissions Committee may deviate from the requirements referred to in paragraph 7 in special cases. In any case, special dispensation will be given to refugees with residence status and refugees with a W-card, who have applied for asylum and have not yet received a final decision on their application.

SECTION 3 – CONTENTS AND STRUCTURE OF THE STUDY PROGRAMMES

3.1 – Aim of the Master's degree

1. The Master's degrees aim to:
   - provide specialised knowledge, skills and insight in (parts of) the life sciences, and enable achievement of the exit qualifications referred to in the second clause below;
   - prepare the student for a career in research, regulation, management and/or communication in the life sciences.
2. The successful Life Sciences' graduate:
   Knowledge and insights

- will be able, with the knowledge of at least one of the specialised subjects of Life Sciences, to make a substantial contribution to the development and/or application of scientific concepts and methods, often in a research context;
- will be able to overview the important, recent developments within the Life Sciences and to point out the implications of these developments on the Life Sciences field and society;
- will be able to adequately use and interpret specialist literature in at least one of the subjects of Life Sciences.

Apply knowledge and insights
- will be able to translate a Life Sciences problem into a relevant research question or approach, suitable for research development, product development, education or society;
- will be able to design a suitable research plan to test the formulated research questions, according to methodological and scientific standards;
- will be able to independently perform research, with the required accuracy. Graduates are able to handle, analyse, interpret and evaluate the empirically derived data in a correct manner;

Judgement
- will be able to discuss the outcomes of empirical research and to link them with scientific theories;
- will be able to indicate the importance of research activities for solving a biomedical question or problem, if applicable from a social perspective;
- will be able to critically reflect on their own research work in Life Sciences, from a social perspective;

Communication
- will be able to comprehensibly report research results verbally and in writing, to specialised and non-specialised audiences in an international context;
- will function effectively in a multidisciplinary research team

Learning skills
- will have the skills to reflect on their own development and study career, and, if necessary, to motivate themselves and make any necessary adjustments;
- will have the skills to function independently and result-oriented in a competitive labour market;
- will have the qualification to be eligible for a PhD position or a position in another sector of the labour market.

3.2 – Attendance mode

The Master's degrees are full-time programmes. The Master's degree Health Sciences is a full-time programme as well as a part-time programme.[8]

3.3 – Language of the programme

1. The Master's programmes are taught in English. This is governed by the Utrecht University Language Code of Conduct.
2. The communication profile (see art. 3.6.6) and the course *Loopbaanoriëntatie en professionalisering* are offered in Dutch.

3.4 – Credit load

The credit load for the Master's degrees in Biological Sciences, Biomedical Sciences, Biosciences, Chemical Sciences, Pharmaceutical Sciences, Science and Business and Neuroscience and Cognition is 120 credits. The credit load for the Master's degree in Health Sciences is 90 credits.

3.5 – Master's programmes and starting times

1. The School provides the following Master's programmes:
   - Applied Data Science prepares the student for a career as professional data scientist, mainly in the health domain but also in other disciplines.
   - Biofabrication prepares the student for a career in multidisciplinary research on the interface of biofabrication, 3D printing techniques, material sciences and clinical applications.
   - Bio Inspired Innovation prepares the student for a career in a R&D, design- or innovation-related environment.

[8] The part-time programme of Epidemiology Postgraduate is offered as an online programme.

- Biology of Disease prepares the student for a career in research in a clinical or biomedical setting to gain insight into mechanisms and processes of disease, with the opportunity to focus on cardiovascular topics.
- Biomedical Image Sciences prepares the student for a career in multidisciplinary research in the field of medical imaging.
- Cancer, Stem Cells and Developmental Biology prepares the student for a career in research in the field of developmental biology, molecular oncology, signal transduction, stem cell technology and molecular genetics.
- Drug Innovation prepares the student for a career in interdisciplinary research in the field of innovation and management of small molecule and bio molecular drugs or development of new approaches for evaluating the quality, efficacy, safety, and performance of the drug.
- Environmental Biology prepares the student for a career in molecular and/or ecological research on plants, plant communities, micro-organisms, animals and/or (marine) ecosystems.
- Epidemiology and Epidemiology Postgraduate prepares the student for a career in research in the field of quantitative analysis of the distribution of health and morbidity in populations (human or veterinary) and their determinants.
- Infection and Immunity prepares the student for a career in research in the field of fundamental and clinical immunology, prevention, diagnosis and treatment of infectious diseases and disorders of immunity.
- Medical Imaging prepares the student for a career in research in the field of medical imaging in the broadest sense, including the physics behind medical imaging acquisition, medical image analysis and applications in science, in the clinic and in industry.
- Molecular and Cellular Life Sciences prepares the student for a career in interdisciplinary research in the field of structural biology, molecular biology and systems biology.
- Neuroscience and Cognition prepares the student for a career in interdisciplinary research in the fields of physiology and pathophysiology of the nervous system and cognition in humans and experimental animals.
- One Health prepares the student for a career in multidisciplinary research on the interface of the health of humans, animals and environment with a clear focus on infectious diseases.
- Regenerative Medicine and Technology prepares the student for a career in multidisciplinary research on the interface of regenerative medicine, technology and clinical applications.
- Science and Business Management prepares the student for a career in a research-related business environment
- Toxicology and Environmental Health prepares the student for a career in research in the field of risk assessment of chemical, physical and biological agents on humans, animals and the environment.

2. Master's programmes can be offered by more than one Master's degree although students will be registered under only one Master's degree. The Master's degree is subject to the approval of the Board of Admissions.
3. The Master's degrees of the School start once or twice per year: always 1 September and some also on 1 February. The Master's programme Biomedical Image Sciences has discontinued. Attached an overview of the Master's degree and Master's programmes with the corresponding starting times:

Master	Start	Master's degree in							
		Biomedical Sciences	Biological Sciences[9]	Biosciences	Chemical Sciences[9]	Pharmaceutical Sciences[9]	Health Sciences	Science & Business	Neuroscience & Cognition
Applied Data Science	Sept						X		
Biofabrication	Sept	X							
Bio Inspired Innovation	Sept		X	X					
Biology of Disease	Sept / Feb	X							
Biomedical Image Science	-	X							
Cancer, Stem Cells and Developmental Biology	Sept	X							
Drug Innovation	Sept			X	X	X			
Environmental Biology	Sept / Feb		X	X					
Epidemiology	Sept	X							
Epidemiology Postgraduate	Sept / Feb[10]						X		
Infection and Immunity	Sept	X							
Medical Imaging	Sept	X							
Molecular and Cellular Life Sciences	Sept / Feb		X	X	X				
Neuroscience and Cognition	Sept								X
One Health	Sept	X							
Regenerative Medicine and Technology	Sept	X							
Science and Business Management	Sept / Feb							X	
Toxicology and Environmental Health	Sept	X							

3.6 – Composition of the Master's programmes

1. The Master's programmes consist of at least the following components:
   - theoretical components;
   - elective components;
   - a research project;
   - a writing assignment[11]

[9] The Master's degrees Biological Sciences, Chemical Sciences and Pharmaceutical sciences is only available for students who already started with the Master's programme. New students will start with the Master's degree Biosciences.
[10] Only the part-time programme of the Master's programme Epidemiology Postgraduate has a start moment in February.
[11] Within Science and Business management, this component will be a business internship.

- an introduction course and seminars in the field of life sciences and professional skills and workshops focussed on personal development (Navigation towards Personal Excellence).

2. The postgraduate master's degree Health Sciences consists of the following compulsory components:
   - Theoretical components;
   - Research project.
3. Subject to approval by the programme coordinator, the student will be required to select one or more elective components. In case elective components are used to prolong the research project, approval of the Board of Examiners is also required. Students may choose elective components from additional components of their Master's programme and/or components of other Master's programmes. The credit loads of the elective components of the specific Master's programmes are given in the appendix under 2.
4. If a student has a learning gap in a Master's programme, art. 3.6 clause 2 does not apply and he/she can be required by the Board of Admission to use all or part of the electives to remedy the gap. It can be remedied with Bachelor's courses (advanced level) or self-study, whose content and nature will be determined by the board of admissions. Study components which are already a part of another degree certificate cannot be used for components mentioned in art 3.6 clause 1.
5. Some master's programmes provide the opportunity to follow a track. A track is a coherent set of programme-specific components, with a credit load of at least 60 credits. The Master's programmes that provide one or more tracks are given in the appendix under 2.
6. Master's programmes provide the opportunity to follow a profile as part of the programme. A profile is a coherent thematic set of study components, with a credit load of 33 credits. The elective components can be used to extend the profile. The School provides the following profiles: applied date science, bioinformatics, communication, education, complex systems, management. The profiles are described in de appendix under 3. Which profiles can be chosen within a specific Master's programme is given in the appendix under 2.
7. In the University Course Catalogue, the learning outcomes, content and type of courses of the components of the different programmes are described in more detail, stating the previous education required to pass the relevant component.

3.7 – Components taken elsewhere

1. A condition for gaining the degree awarded after passing the Master's examination of the study programme is that at least 60 credits of the study programme are gained in components provided by Utrecht University, UMC Utrecht and/or the Hubrecht institute. The exception is Health Sciences, which requires 56 credits.
2. Components passed elsewhere during the study programme can only be incorporated in the student's examination programme with prior permission from the Board of Examiners.
3. Exemption or credit tranfer can be granted for components passed at another institute of higher education prior to the start of the Master's programme only on the basis of art. 5.13.

3.8 – Honours Programme

1. The study programme has two Honours Programmes, which are both open to all students:
   - Utrecht Selective Life Sciences ExtraCurricular Track (U/Select)
   - Quantitative Biology & Computational Life Sciences (QBio)
2. U/Select is a two-year extracurricular programme that consists of the following components:
   - monthly meetings (*master classes*);
   - writing of a research project proposal;
   - a minor research project abroad;
   - presentation of the research project during a mini-symposium.

   Each year, a committee will select several students for participation in the U/Select. Selection will be based on the following criteria:
   - motivation of the student;
   - extracurricular activities;
   - past performance study results;
   - recommendation of the programme coordinator or research project supervisor.

   The selection procedure will be published on the School's website.

   The Board of Studies may decide to terminate participation in U/Select when:
   - a student has not shown active participation in the master classes of U/Select;
   - a student has not earned a satisfactory mark for the research proposal;
   - a student has not studied within the official time period;

- the Board of Examiners has taken any decision that fraud/plagiarism was committed (as described in art. 5.14).

3. The Honours Programme QBio consists of a QBio introductory course, a journal club, a research project and a research proposal. Every year, a number of students are selected for participation in the Honours Programme by the coordinators. Criteria are:
   - motivation of the student;
   - recommendation of the supervisors of the current Master's programme
   - grades and relevant courses in the bachelor's programme;
   - grades and direction during high school.

   Based on this, students are selected for the QBio introductory course. The second selection will take place after the course. The coordinators select up to 12 students each year who attend the entire programme. This selection is based on abovementioned criteria and:
   - general performance during the QBio introductory course;
   - competence to perform interdisciplinary quantitative biology research;
   - contribution during lab rotations and discussions of papers.

   The selection procedure will be published on the QBio website.
4. The applicant will receive a decision of admission or rejection for the Honours Programme, which will also inform the applicant of the opportunity to appeal to the Executive Board.

3.9 – Actual teaching structure

1. The number of contact hours for the academic programme (number of scheduled contact hours for the research projects and the writing assignment) comes to an average of two hours (5% of study load) a week. For courses the number of contact hours varies from 8 up to 40 hours (20-100%) a week (on the basis of a fulltime course).[12]
2. Before the start of the course, the student has the following information:
   a. scheduling of the educational activities;
   b. timetables and scheduling of the hourly periods;
   c. scheduled contact time per course;
   d. when and where the exam(s) of the course will take place.

SECTION 4 – EDUCATION

4.1 – Study components

All study components which can make up part of the study are published on the University Course Catalogue

4.2 – Required sequence of components

1. The programme coordinator determines the order in which compulsory components of a Master's programme must be completed.
2. Course-specific entry requirements are given in the University Course Catalogue.

4.3 – Registration for courses

Participation in a course is possible only if the student has registered for it in good time. The programme coordinator determines how and when registration takes places. The information about course registration are published in the University Course Catalogue.

4.4 – Attendance obligation and obligation to perform to the best of one's ability

1. Each student is expected to participate actively during each study component for which he or she is registered.
2. Besides the general requirement for the student to participate actively in the study component, the additional requirements for each component are listed in the University Course Catalogue.
3. In the event of qualitatively or quantitatively inadequate participation, the coordinator may exclude the student from further participation in the study component or from part of it.

4.5 – Evaluation of the quality of education

1. The Board of Studies is responsible for monitoring the quality of the education. To this end, the education director will ensure that an evaluation of the courses is made, as well as an evaluation at curriculum level. In this quality control of the courses he will draw on the advice

[12] The study load for the part-time (online) programme of Epidemiology Postgraduate is approximately 14 hours per week.

and suggestions for improvement of the education committees on promoting and safeguarding the quality of the course.
2. The education within the Master's degree will be evaluated in the following manner:
   - course evaluations;
   - evaluations of research projects and writing assignments;
   - evaluations at the level of the curriculum;
   - National Student Survey (NSS)
3. The students who have participated in the course will be informed within 6 weeks by the course coordinator about the results of the course evaluations and the changes made and measures taken in response to the course evaluation.

SECTION 5 – TESTING

5.1 – General

1. During the study component, the student will be tested for the extent to which the student has sufficiently achieved the learning goals, in order to achieve the learning outcomes of the School. The testing of the student will be concluded at the end of the study component.
2. The University Course Catalogue describes what the student must achieve in order to pass the course and the criteria on which the student is assessed.
3. The testing procedure is described in the Rules and Regulations of the Board of Examiners that is published on the School's website.

5.2 – Board of Examiners

1. The dean will set up a Board of Examiners for the Graduate School of Life Sciences and will put in place sufficient guarantees that this Board will work in an independent and expert manner.
2. The dean will appoint the chair and the members of the Board of Examiners for a period of three years on the basis of their expertise in the field of the programme(s) in question or the field of examining whereby:
   - at least one member comes from outside the group of Master's programmes concerned, and
   - at least one member is a lecturer on the group of Master's programmes concerned.

   Re-appointment is possible. Before making this appointment, the dean will consult the members of the Board of Examiners concerned.
3. Persons holding a management position with financial responsibility or (partial) management responsibility for a programme of study may not be appointed as a member or chair of the Board of Examiners. This will in any event include: the dean, vice-dean; the director/head/manager of a department; a member of a departmental management/administrative team; a member/chair of the Board of Studies of the Graduate School or the Undergraduate School and the director of education.
4. Membership of the Board of Examiners will terminate upon expiry of the period of appointment. In addition, the dean will discharge the chair and the members from their duties at their request. The chair and the members will also be dismissed by the dean in the event that they no longer fulfil the requirements stated in paragraphs 2 or 3 of this article. In addition, the dean may dismiss the chair and the members in the event that they fail to perform their statutory duties inadequately.
5. The dean will make the composition of the Board of Examiners known to the students and teaching staff.

5.3 – Assessment: research project, internship, or writing assignment

1. A (theoretical) course is assessed by the examiner (a staff member of Utrecht University or University Medical Center Utrecht).
2. A business internship, writing assignment or research project is assessed by the examiner (a staff member of Utrecht University or University Medical Center Utrecht) and one or more other internal and/or external experts.
3. A major research project has to be assessed within 12 months after the start of the project. A minor research project or business internship have to be assessed within 9 months after the start of the project/internship. On request of the student, the research coordinator can provide an exception on this rule in special cases.
4. A writing assignment has to be assessed within 3 months after the start of the assignment. On request of the student, the research coordinator can provide an exception on this rule in special cases.

5.4 – Marks

1. Marks are awarded on a scale of 1 to 10. A mark of 5.5 (not rounded off) or higher is satisfactory, and lower is unsatisfactory. The examiner determines the final grade expressed with one decimal figure, which will be rounded off mathematically. Marks will be rounded off as follows: If the second decimal is a 5 or higher, the first decimal will be rounded up. If the second decimal is a 4 or lower, the first decimal will be rounded down. This does **not** apply to grades between 5.45 and 5.50 and between 3.95 and 4.00: these will be round off to 5.4 and 3.9, respectively. In Osiris final grades between 5.0 and 5.4 will be rounded down to 5.0, grades from 5.5 to 5.9 will be rounded up to 6.0. Other grades will not be rounded off in Osiris.
2. Partial marks of the research projects and business internships should each be satisfactory.
3. Alphanumeric results are awarded in the following cases
   - a student who is registered for a course and has not participated in any of the test modules will be given an ND (Niet Deelgenomen – Not Participated);
   - a student who is registered for a course and has not participated in all the test modules or has not fulfilled all the requirements of the test modules will be given an NVD (Niet VolDaan – Incomplete);
   - if the student has complied with a module, but has not received a mark for it, he/she may be given a V (Voldoende – Satisfactory) as the result;
   - if the student has not complied a module and does not receive a mark for it, the student can be given an ONV (ONVoloende - Unsatisfactory) as the result;
   - a student who has been granted exemption by the Board of Examiners will be given a VR (VRijstelling – Exemption);
   - if the Board of Examiners establishes fraud, the student will be given an NVD (Niet VolDaan - Incomplete) as the result.

5.5 – Making-up: additional or substitute test

1. If the student has fulfilled all the obligations to perform to the best of his or her ability during the course, and the final mark is at least a four (not rounded off), he or she will be given a once-only possibility to sit an additional or substitute test.
2. Satisfactory tests are not eligible for substitute testing or re-examination.
3. In cases where the examiner has decided that for certain components a minimum mark has to be obtained and this obligation has not been fulfilled, the student will be given a once-only possibility to sit an additional or substitute test for that component, when the mark was at least a four (not rounded off).
4. If a calamity occurs during a digital test, there will be handled in accordance with the Emergency plan Digital Testing. The examiner decides on the most appropriate solution that offers a replacing test in the case of the cancellation of the digital test within two weeks after the original test date.

5.6 – Type of test

1. Testing within a study component is done in the manner described in the University Course Catalogue.
2. At the student's request, the Board of Examiners may allow a test to be administered otherwise than as stipulated in the first clause.

5.7 – Oral testing

1. Unless the Board of Examiners decides otherwise, only one person at a time may be tested orally.
2. Oral tests will be administered in public, unless the Board of Examiners or the examiner concerned decides otherwise, or if the student objects to this.
3. During the oral test, the presence of a second staff member is required.

5.8 – Provision for testing in special cases

1. The Board of Examiners may decide to grant an individual testing possibility if not providing such a possibility would result in a 'special case of manifest unfairness'.
2. Requests for a special possibility to take a test must be submitted to the Board of Examiners as soon as possible, with supporting evidence.
3. Article 5.5 is applicable by analogy to the individual testing possibility referred to in the first and second paragraph. This means that the student who:
   - has missed the regular final examination of the course due to circumstances beyond his or her control, and
   - sits the test after all by way of an individual testing possibility,

will be given the opportunity to sit a supplementary or alternative test if he or she has been given an unsatisfactory final mark of at least a four.

5.9 – Time limit for marking tests

1. The examiner will determine the mark immediately, or within 24 hours, after administering an oral test, and will provide the student with written proof of the outcome and provide the administration of the School with the relevant information.
2. The examiner will record the assessment of a test, whether written or taken in another manner, within 10 working days of the day on which this test was taken, and will supply the School's administration with the data required for it to issue the student with the written or electronic proof of this assessment.
3. The written proof of the outcome shall inform the student of the right of inspection referred to in article 5.11 and of the possibility to appeal to the Examinations Appeals Board.

5.10 – Period of validity

1. The term of validity of courses passed is unlimited. Contrary to this, the Board of Examiners may impose an additional or alternative test for a course, the test for which was passed more than five years earlier, if the knowledge or understanding being examined is demonstrably out of date, or if the skills being examined are demonstrably out of date..
2. The period of five years referred to in paragraph 1 will be extended by the number of months of financial support that the student has been granted on the grounds of the Profiling Fund (*profileringsfonds* - for special financial support to students) as referred to in paragraph 2a of the Higher Education and Research Act and the period granted or an extension of the performance-related grant due to a disability or chronic illness.
3. Partial tests and assignments which were passed will lose their validity if the course witihin which they were taken was not passed.

5.11 – Right of inspection

1. Upon request, the student will be allowed to inspect his/her marked work for at least thirty days after the result of a written test has been announced. Test questions and assignments will be collected after conducting and inspection of the test.
2. During this thirty-day period, the student may inspect the questions and assignments of the test concerned, and the standards on which the mark was based.

5.12 – Storage time of test papers

1. The assignments, their completion and the work assessed in the written tests will be kept (in paper or digital form) for a period of two years following the assessment.
2. The reports of minor and major research projects and the writing assignment as well as the assessment forms will be kept (in paper or digital form) for a period of seven years following the assessment.

5.13 – Exemption and credit transfer

1. At the student's request, the Board of Examiners may, after consulting the examiner concerned, grant the student exemption of (part of) the electives from a programme if he/she:
   a. has completed an equivalent component of a university Master's programme prior to the start of this Master's programme; or
   b. has demonstrated through work or professional experience that he/she has sufficient knowledge and skills in relation to that component.
2. Exempt components need to be part of the electives and have a maximum credit load of 12 credits.
3. Credit transfer 1: At the request of a student, and after advise of the programme coordinator, the board of examiners may allow a component passed elsewhere at an institution for higher education while registered for the programme, for example, during an exchange semester, to count towards the programme's examination requirements. These components may not be used for a diploma of another degree. The board of examiners will decide on the transcript of the mark and the workload involved.
4. Credit transfer 2: At the request of a student the Board of Examiners may allow components, taken at an institute for higher education and complying with clause 1 of this article, and that were not used for other degree certificates, to contribute to the requirements of final examination.

5.14 – Fraud and plagiarism

1. Fraud and plagiarism are defined as an action or failure to act on the part of a student, whereby a correct assessment of his or her knowledge, insight and skills is made impossible, in full or in part.
   Fraud includes:
   - cheating during examinations. The person offering the opportunity to cheat is an accessory to fraud;
   - possession of tools and resources during examinations (i.e. carry with them), such as preprogrammed calculators, mobile phones, books, smart watches, smart glasses, course readers, notes, etc., consultation of which is not explicitly permitted;
   - having others carry out all or part of an assignment and posing as own work;
   - gaining access to questions or answers of an examination prior to the date or time that the examination takes place;
   - making up survey or interview answers or research data;
   - signing attendance forms, assessment forms i.e., in the name of someone else.

   Plagiarism is defined as including data or sections of text from others in a writing assignment or other paper without quoting the source. Plagiarism includes the following:
   - cutting and pasting text from digital sources such as powerpointslides, encyclopedias or digital publications without using quotation marks and referring to the source;
   - cutting and pasting text from the internet without using quotation marks and referring to the source;
   - using excerpts from printed material such as books, magazines or other publications or encyclopedias without using quotation marks and referring to the source;
   - using a translation of the abovementioned texts without using quotation marks and referring to the source;
   - paraphrasing the abovementioned sources without referring to the (sound) source: paraphrasing should be marked in such a way that it does not suggest the text is the students range of thought;
   - using visual, audio or test material from others without referring to the source and presenting this as own work;
   - resubmission of the student's own earlier work without source references, and allowing this to pass for work originally produced for the purpose of the course, unless this is expressly permitted in the course or by the lecturer.
   - using the work of other students and passing this off as own work. If this happens with the permission of the other student, the latter is also guilty of plagiarism;
   - in the event that, in a joint paper, one of the authors commits plagiarism, the other authors are also guilty of plagiarism, if they could or should have known that the other was committing plagiarism;
   - submitting papers obtained from a commercial institution (such as an internet site offering excerpts or papers) or having such written by someone else in return for payment.
2. a. In all cases in which fraud or plagiarism is found or suspected, the examiner will inform the student and the Board of Examiners of this in writing.
   b. The Board of Examiners will give the student a possibility to:
      - respond to that in writing;
      - to be heard.
3. The Board of Examiners will determine whether fraud or plagiarism has occurred and will inform the student of its decision in writing and of the sanctions in accordance with the stipulations of the fourth paragraph, stating the possibility of appeal to the Examinations Appeals Board.
4. Fraud and plagiarism will be punished by the Board of Examiners as follows:
   a. In any event:
      - invalidation of the paper or examination submitted;
      - a reprimand, a note of which will be made in OSIRIS.
   b. In addition – depending on the nature and scale of the fraud or plagiarism, and on the student's phase of study – one or more of the following sanctions:
      - removal from the study component;
      - no longer being eligible for a positive degree classification (cum laude) as referred to in art. 6.2;
      - exclusion from participation in examinations or other forms of testing belonging to the educational component concerned for the current academic year, or for a period of 12 months;

- complete exclusion from participation in all examinations or other forms of testing for a period of 12 months;
- exclusion from participation in the Honours Programmes as referred to in art. 3.8.

c. In the event that the student has already received a reprimand:
- complete exclusion from participation in all examinations or other forms of testing for a period of 12 months.

d. In the case of extremely serious and/or repeated fraud, the Board of Examiners may recommend that the Executive Board to permanently terminate the concerned student's registration for the programme.

5. If the Board of Examiners determines that there has been widespread or organised fraud, on a scale which would affect the examination results in their entirety, the Board of Examiners will decide without delay that the examination concerned is invalid and that all the participants must resit the whole examination at short notice. The Board of Examiners will set the date on which the examination must be retaken. This date will be no later than two weeks after the fraud was established, so that the participants can still benefit from their preparatory work for the examination.

SECTION 6 – EXAMINATIONS

6.1 – Examination

1. After the student has fulfilled the requirements of the examinations programme, the Board of Examiners will determine the result of the examination and award a degree certificate as referred to in art. 6.4 of this regulation.
2. Prior to determining the examination result, the Board of Examiners may examine the student's knowledge of one or more components or aspects of the study programme, if and in so far as the results of the relevant tests give them reason to do so.
3. Assessment of the examinations file constitutes part of the final examination. The date of examination will be the last working day of the month in which the Board of Examiners has determined that the student has fulfilled the requirements of the examinations programme. The student must be registered for the study programme on the date on which the examination is held.
4. The examination will be passed on condition that all components have been passed.
5. A further condition for passing the examination and receiving the certificate is that the student was registered for the course during the period in which the tests were taken. If the student does not fulfil this condition, the Executive Board may issue a statement of no objection in relation to the passing of the examination and the issue of the certificate, after the student has paid the tuition fees and administration charges owing for the 'missing' periods.
6. A student who has passed an examination and is therefore entitled to be awarded a certificate, may request that the Board of Examiners delay the granting of the certificate and the date of the examination. Such a request must be submitted within two weeks after the student has been informed of the examination results, stating the date on which the student wishes to receive the certificate. The Board of Examiners will in any case grant the request in the academic year 2018-2019 if the student:
   - plans to fulfil a management position for which Utrecht University has provided a board activities grant.
   - will do an internship or component abroad

   The Board of Examiners may also grant the request if refusal would result in an exceptional case of extreme unfairness on account of the circumstance that the student concerned could not have taken automatic graduation into account when he or she was planning his or her study.

6.2 – Cum laude classification

1. The '*cum laude*' classification will be awarded to the Master's student if each of the following conditions has been met:
   a. a mark of at least 8.5 has been earned for the major research project;
   b. a mark of at least 8.5 has been earned for the minor research project or profile;
   c. a mark of at least 8.5 has been earned for the writing assignment;
   d. a weighted (to credits) average mark of at least 8.0 has been earned for the other components of the programme, and no grades below 7.0;
   e. no re-examinations or substitute or replacement tests were taken;
   f. exemptions that do not count have been obtained for no more than 12 credits;

   g. the Board of Examiners has not taken any decision (as referred to in article 5.14, clause 4 under b) that fraud/plagiarism was committed;
   h. the final examination of the Master's Degree Programme was passed within 1,5x the normal study duration.
2. For Biofabrication, the '*cum laude*' classification is applicable when students pass their education in Australia with High Distinction (85% or higher).
3. For Biomedical Image Sciences and Epidemiology condition b of clause 1 is not applicable
4. For Applied Data Science and Epidemiology Postgraduate conditions b and c of clause 1 are not applicable.For Science and Business Management clause b is applicable for the *business internship* and clause c is not applicable.

6.3 – Degree

1. The Master of Science (MSc) degree will be awarded to students who pass the examination.
2. The degree awarded will be stated on the examination certificate.
3. The examination certificate will also state the Master's degree and the specific Master's programme followed.

6.4 – Degree certificate and IDS

1. The Board of Examiners will award a certificate as proof that the examination was passed. One certificate will be issued for each Graduate School degree, even if a student completes several programmes within that degree.
2. The Board of Examiners will add the International Diploma Supplement in the English language to this certificate, which provides (international) insight into the nature and contents of the completed study programme.

6.5 – Honours

If the Honours programme as referred to in art. 3.8 has been passed, a separate certificate will be awarded on which this is stated.

6.6 – Grading Tables

The International Diploma Supplement gives the student's weighted average final mark and an ECTS Grading Table. This will show how students have performed compared to their peers at Utrecht University. It also enables the graduate to demonstrate to educational institutions and employers abroad the value of the marks obtained in the Netherlands.

SECTION 7 – STUDENT COUNSELLING

7.1 –Students' progress records

1. The School records individual student's results and makes them available through *Osiris-student* (the university student administration system).
2. A certified student progress file can be obtained from the School's administration.

7.2 – Student counselling

7. The School will ensure adequate study support for those students registered for a Master's degree.
8. Student support encompasses:
   1. appointment of a study supervisor[13] who is responsible for:
      - encouraging students to feel part of the community;
      - supervising programme choices;
      - assisting a student to get his or her bearings on the job market.
   2. referring and assisting students who encounter difficulties during their studies;

7.3 – Disability and chronic illness

Students with a disability or chronic illness will be offered the opportunity to take courses and sit examinations in an adapted manner as laid down in his/her Education Facilities Contract. Requests to draw up such a study contract must be submitted to the academic counsellor.

[13] The role of study supervisor is carried out by the programme coordinator and the academic counsellor.

SECTION 8 – TRANSITIONAL AND FINAL PROVISIONS

8.1 – Safety-net scheme

In cases for which these Education and Examination Regulations make no (clear) provision or lead to obviously unreasonable outcomes, the decision of the Board of Studies (on behalf of the Dean), after consulting the Board of Examiners, will be final. If, on the basis of the law, the decision falls within the competence of the Board of Examiners, the dean will send the request to the Board of Examiners for it to handle. In case of differences (of interpretation) between the Dutch and English version of these Education and Examination Regulations, the Dutch version prevails.

8.2 – Amendments

1. Amendments to these regulations will be adopted by the Dean in a separate resolution after consulting the Education Committee and after the approval of the faculty councils for Science, Medicine and Veterinary Medicine.
2. Amendments to these regulations shall not apply to the current academic year, unless it is reasonable to assume that they will not harm the interests of the students.
3. Furthermore, amendments may not have an adverse effect on students as regards any decision taken in relation to a student pursuant to these regulations.

8.3 – Publication

The Dean shall ensure proper publication of these regulations, and of the rules and guidelines adopted by the Board of Examiners, and of any amendment to these documents, on the School's website.

8.4 – Effective date

These Education and Examination Regulations come into force on September 1st 2018, and replace the Education and Examination Regulations of all previous academic years.

APPENDICES

1. Maximum number of admissions each academic year (art. 2.3 clause 7)

Master's programme:	Max. capacity
Applied Data Science	25
Bio Inspired Innovation	no maximum
Biofabrication	no maximum
Biology of Disease	40
Cancer, Stem Cells and Developmental Biology	35
Drug Innovation	48
Environmental Biology	no maximum
Epidemiology	no maximum
Epidemiology Postgraduate	no maximum
Infection and Immunity	30
Medical Imaging	no maximum
Molecular and Cellular Life Sciences	no maximum
Neuroscience and Cognition	55
One Health	25
Regenerative Medicine and Technology	30
Science and Business Management	60
Toxicology and Environmental Health	no maximum

2. Composition of the Master's programmes (ad. art. 3.6)[14]

a. Applied Data Science

Component:	Credits (EC):	OSIRIS-code:
Research project	45	BMB500517
Free elective components	22,5	varies
Master's courses	22,5	see below
Total	90	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (22,5 EC):		
Data Science & Society	7,5	INFOMDSS
Data Analysis & Visualisation	7,5	201600038
Computational Thinking	7,5	INFOMCTH

Recommended primary electives for full-time programmes (22,5 EC)		
Knowledge Management	7,5	INFOKMT
Advanced Research Methods	7,5	INFOARM
Seminar Medical Informatics	7,5	INFOMSMI

Additional electives for part-time programmes:		
Business Intelligence	7,5	INFOMBIN

[14] Definitions courses:
Mandatory courses: mandatory for each student in this programme or a specific track.
Primary elective courses: a choice has to be made from a specified list of courses for a certain amount of credits by all students form the programme or a specific track.
Secondary elective courses: in case courses are divided over two separate lists (for example core courses and advanced courses) a choice has to be made from a second specified list of courses for a certain amount of credits by all students form the programme or a specific track.

Profiles:
Students of this Master's programme can choose the following profiles:
- none

b. Biofabrication

Dutch students with single degree:

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Dutch students with double degree:

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	60	tbd
Minor research project	33	tbd
Writing assignment	7,5	tbd
Free elective components	3	varied
Master's courses	15	see below
Total	120	

International students with double degree:

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Writing assignment	7,5	BMB463007
Universiteit herkomst double degree	60	tbd
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (15 ec):

Introduction to Biofabrication	15	BMB502415

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Single degree students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

Double degree students cannot choose a profile.

[15] 1 week Introducing Life Sciences (26 hours), 3 Navigation Towards Personal Excellence workshops and 7 Life Sciences seminars, of which 2 seminars can be followed outside the GSLS after approval of the programme coordinator. Students that started the Master's programme before September 2018 can follow the old version of the introduction course (BMB509713) and Life Sciences seminars (BMB509214 or GSLS-SEMIN).

c. Bio Inspired Innovation

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	GSLS-ACAD
Major research project	51	GSLS-MAJRP
Minor research project	33	GSLS-MINRP
Writing assignment	7,5	GSLS-WRIAS
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (15 ec):

Bioinspiration & Value Creation	7,5	B-MBIVA
Integrative Bio-Inspired Design: the systems level	7,5	B-MIBID

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

d. Biology of Disease

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)
- Cardiovascular Research

Master's courses regular programme

Mandatory courses (3 ec):

Students that started before 1 September 2017:		
Mechanisms of disease	3	BMB500503
Students that started after 1 September 2017:		
Kick-off Biology of Disease	3	BMB510817

Primary electives(12 ec):

Biomolecular and Cellular Cardiology	3	BMB403905
Essentials of Neuroscience	3	BMB416005
Biology of Disease – Immunity and Infection	3	BMB501103
Metabolic Pathways	3	BMB501314

Medical Physiology	3	BMB506213
Pathology	3	BMB507310
Thrombosis and Haemostasis	3	BMB508212
Cardiovascular Immunology	3	BMB509113
Cardiac Regenerative Medicine	3	BMB580117
Cardiovascular Epidemiology	1,5	tbd

Courses within the track Cardiovascular Research[16]:
Master's courses in cardiovascular field 12 ec

Mandatory courses (3 ec):

Kick-off Biology of Disease	3	BMB510817

Primary electives (12 ec):

Biomolecular and Cellular Cardiology	3	BMB403905
Cardiovascular Immunology	3	BMB509113
Thrombosis and Haemostasis	3	BMB508212
Cardiac Regenerative Medicine	3	BMB580117
Cardiovascular Epidemiology	1,5	tbd

Profiles:
As replacement of the minor research project (possible extended with free elective components). Students of this Master's programme can choose the following profiles:

- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

e. Biomedical Image Sciences

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Research project	54	BMB505607
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	45	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:

- Regular programme (no track)

Master's courses regular programme

Mandatory courses (30 ec):

Medical Image Formation	7,5	BMB501703
Capita Selecta in Medical Imaging	7,5	BMB502503
Image Processing I	7,5	BMB502805
Image Processing II	7,5	BMB502905

Primary electives(15 ec):

Radiotherapy Physics	7,5	BMB504606
Mathematics for BIS	7,5	BMB501803
Advanced MR Physics	7,5	BMB502003
Anatomy and Physiology I	7,5	BMB502605

Profiles:

[16] The major research project and writing assignment have to be in the chosen research field.

Students of this Master's programme can choose the following profiles:
- none

f. Cancer, Stem Cells and Developmental Biology

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Mandatory courses (3 ec):

Introducing Cancer, Stem Cells & Dev. Biology	3	BMB505416

Primary electives(15 ec):

Advanced R for Life Sciences	1,5	B-MADR
Concepts in Cancer Biology	1,5	BMB400306
Chromosome Segregation, Aneuploidy and Cancer	1,5	BMB404107
Cell organisation in Health and Disease	1,5	BMB436006
Zebrafish in Development, Organogenesis and Disease	1,5	BMB451007
Human Disease Genetics	1,5	BMB453007
Introduction to Python for Life Sciences	1,5	BMB465014
Metabolic pathways: from cell to disease	3	BMB501314
Advanced Bioinformatics: Data mining and data integration for Life Sciences	1,5	BMB502114
Introduction to R for Life Sciences	1,5	BMB502214
Advanced Omics for Life Sciences	1,5	BMB502316
Model Organism Genetics	1,5	BMB505316
Developmental Genetics	1,5	BMB506508
Digital Pictures: Data Integrity and Display	1	BMB507009
Analytics and Algorithms for Omics Data	1,5	BMB508218
Introduction to Stem Cells	3	BMB509013
Gene Expression, Epigenetics and Disease	3	BMB509413
Introduction to Bioinformatics for Life Sciences	3	B-MINBI08
Introduction Biomolecular Mass Spectrometry	1,5	SK-MBAPBMS

Every other GSLS course with a maximum of 4,5 EC.

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

g. Drug Innovation

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	GSLS-ACAD
Major research project	42-51[17]	GSLS-MAJRP
Minor research project	33	GSLS-MINRP
Writing assignment	7,5	GSLS-WRIAS
Free elective components	12	varied
Master's courses	15-24	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)
- Experimental Pharmacology

Master's courses regular programme

Mandatory courses (15 ec):

Drug Discovery	7,5	DI-408-09
Drug Development and Regulation	7,5	DI-409-09

Courses within the track Experimental Pharmacology[18]:

Mandatory courses (22,5 ec):

Drug Discovery	7,5	DI-408-09
Drug Development and Regulation	7,5	DI-409-09
Advanced Pharmacology	7,5	DI-411-13

Primary electives(1,5 ec):

Understanding Drugs	3	DI-407
Design of anti-effective drugs	7,5	FA-441
Chemical Biology	7,5	FA-450
Summerschool Pharmaceutical Policy Analysis	1,5	DI-SUM-PDS
Summerschool Pharmacoeconomics	1,5	DI-SUM-PHA
Summerschool Pharmacoepi. & Drug Safety	1,5	DI-SUM-PPA

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

h. Environmental Biology

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	GSLS-ACAD
Major research project	51	GSLS-MAJRP
Minor research project	33	GSLS-MINRP
Writing assignment	7,5	GSLS-WRIAS
Free elective components	12	varied
Master's courses	15	see below
Total	120	

[17] Students Drug Innovation are allowed to conduct a major research project of 42 credits and 9 credits in extra theoretical courses, subject to the approval of the programme coordinator.
[18] The major research project and writing assignment have to be in the chosen research field.

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)
- Ecology and Natural Resource Management
- Behavioural Ecology
- Plant Biology
- Fungal Biology
- Biomarine Sciences and Palaeoecology

Master's courses regular programme

Primary electives (mandatory courses from the list, 15 ec)

Molecular plant physiology and biotechnology	7,5	B-MPPB05
Evolutionary Perspectives of Sexual Behaviour	6	B-MEPSB
Measuring Behaviour	7,5	B-MMBE07
Primate culture, empathy and morality	2,5	B-MPCEMD
Zoo Conservation Biology	6	B-MZCB
Ecology and Natural Resources	7,5	B-MENR
Management of Natural Resources in Context	7,5	B-MNMAN
Introduction in Fungal Biology	3	B-MEBIFB
Food and Indoor Fungi	1,5	B-MFIF
Fungal Biodiversity	3	B-MEBFBDIV
Molecular Fungal biology	7,5	B-MEBMFB

Courses within the track Ecology and Natural Resource Management[19]:

Mandatory courses (15 ec):

Ecology and Natural Resources	7,5	B-MENR
Management of Natural Resources in Context	7,5	B-MNMAN

Courses within the track Behavioural Ecology[19]:

Mandatory courses (1,5 ec):

Measuring Behaviour	1,5	B-MMBE07

Primary electives(mandatory courses from the list, at least 7,5 ec):

Zoo Conservation Biology	6	B-MZCB
Evolutionary Perspectives of Sexual Behaviour	6	B-MEPSB
Primate culture, empathy and morality	2,5	B-MPCEMD
Ethology and welfare	6	BMB503905

Secondary electives (choose from second list):

Molecular plant physiology and biotechnology	7,5	B-MPPB05
Introduction in Fungal Biology	3	B-MEBIFB
Food and Indoor Fungi	1,5	B-MFIF
Fungal Biodiversity	3	B-MEBFBDIV
Molecular Fungal biology	7,5	B-MEBMFB
Ecology and Natural Resources	7,5	B-MENR
Management of Natural Resources in Context	7,5	B-MNMAN

Courses within the track Plant Biology[19]:

Primary electives(mandatory courses from the list, at least 7,5 ec)

Plant Microbe Interactions	3	B-MEPMI
Plant Environment Interactions	3	B-MPEI
Applied Plant Biology	4.5	B-MEAPB
Genes to Organisms	3	SK-MCG2O

[19] The major research project has to be in the chosen research field.

Secondary electives (choose from second list):

Ecology and Natural Resources	7,5	B-MENR
Evolutionary Perspectives of Sexual Behaviour	6	B-MEPSB
Measuring Behaviour	7,5	B-MMBE07
Primate culture, empathy and morality	2,5	B-MPCEMD
Zoo Conservation Biology	6	B-MZCB
Introduction in Fungal Biology	3	B-MEBIFB
Food and Indoor Fungi	1,5	B-MFIF
Fungal Biodiversity	3	B-MEBFBDIV
Molecular Fungal biology	7,5	B-MEBMFB
Management of Natural Resources in Context	7,5	B-MNMAN

Courses within the track Fungal Biology[19]:

Primary electives(mandatory courses from the list, at least 9 ec)

Introduction in Fungal Biology	3	B-MEBIFB
Food and Indoor Fungi	1,5	B-MFIF
Fungal Biodiversity	3	B-MEBFBDIV
Molecular Fungal biology	7,5	B-MEBMFB

Secondary electives (choose from second list):

Molecular plant physiology and biotechnology	7,5	B-MPPB05
Evolutionary Perspectives of Sexual Behaviour	6	B-MEPSB
Measuring Behaviour	7,5	B-MMBE07
Primate culture, empathy and morality	2,5	B-MPCEMD
Zoo Conservation Biology	6	B-MZCB
Ecology and Natural Resources	7,5	B-MENR
Management of Natural Resources in Context	7,5	B-MNMAN

Courses within the track Biomarine Sciences and Palaeoecology[19]:

Primary electives(mandatory courses from the list, at least 9 ec)

Introduction to Marine Sciences	7,5	GEO4-1451
Paleo oceanography & climate variability	7,5	GEO4-1405
Evolutionary paleobiology and proxies	7,5	GEO4-1422
Aquatic and environmental geochemistry	7,5	GEO4-1439
Microbes and biogeochemistry	7,5	GEO4-1440
Estuarine Ecology	7,5	GEO4-1452
Reconstructing Quaternary environments	7,5	GEO4-4409

Secondary electives (choose from second list):

Molecular plant physiology and biotechnology	7,5	B-MPPB05
Evolutionary Perspectives of Sexual Behaviour	6	B-MEPSB
Measuring Behaviour	7,5	B-MMBE07
Primate culture, empathy and morality	2,5	B-MPCEMD
Zoo Conservation Biology	6	B-MZCB
Ecology and Natural Resources	7,5	B-MENR
Management of Natural Resources in Context	7,5	B-MNMAN
Introduction in Fungal Biology	3	B-MEBIFB
Food and Indoor Fungi	1,5	B-MFIF
Fungal Biodiversity	3	B-MEBFBDIV
Molecular Fungal biology	7,5	B-MEBMFB

Profiles:
As replacement of the minor research project (possible extended with free elective components). Students of this Master's programme can choose the following profiles:

- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication

- Education

i. Epidemiology

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Research project	65	BMB502109
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	34	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (21 ec):

Introduction to Epidemiology	3	BMB402903
Introduction to Statistics	1,5	BMB404005
Study Design in Etiologic Research	3	BMB403014
Classcial Methods in Data Analysis	6	BMB403303
Modern Methods in Data Analysis	4,5	BMB417005
Presentation and Writing Research Proposals	2	BMB422016
Research Ethics and Society	1	BMB506708

Primary electives(13 ec):

Specialisation Pharmacoepidemiology	13	BMB508416
Specialisation Medical Statistics	13	BMB507716
Specialisation Occ and Env Epidemiology	13	BMB508116
Specialisation Clinical Epidemiology	13	BMB507216
Specialisation Veterinary Epidemiology	13	BMB508716
Specialisation Infectious Diseases Epidemiology	13	BMB507416

Profiles:
Students of this Master's programme can choose the following profiles:
- none

j. Epidemiology Postgraduate

Component:	Credits (EC):	OSIRIS-code:
Research project	56	BMB504809
Master's courses	34	see below
Total	90	

Variants:
- Students of this Master's programme can choose the following profiles variants:
- Face-to-face
- Online

Courses within the face-to-face programma:

Mandatory courses (21 ec):

Introduction to Epidemiology	3	BMB402914
Introduction to Statistics	1,5	BMB404014
Study Design in Etiologic Research	3	BMB403615
Classical Methods in Data Analysis	6	BMB403314
Modern Methods in Data Analysis	4,5	BMB417014
Presentation and Writing Research Proposals	2	BMB422016
Research Ethics and Society	1	BMB506714

Primary electives(13 ec):

Specialisation Clinical Epidemiology	13	BMB507116
Specialisation Infectious Diseases Epidemiology	13	BMB507616
Specialisation Medical Statistics	13	BMB507816
Specialisation Occ and Env Epidemiology	13	BMB508016
Specialisation Pharmacoepidemiology	13	BMB508316
Specialisation Veterinary Epidemiology	13	BMB508616

Courses within the online programma:

Mandatory courses (21 ec):

Introduction to Epidemiology	3	BMB402914
Introduction to Statistics	1,5	BMB404014
Study Design in Etiologic Research	3	BMB403615
Classical Methods in Data Analysis	6	BMB403314
Modern Methods in Data Analysis	4,5	BMB417014
Presentation and Writing Research Proposals	2	BMB422016
Research Ethics and Society	1	BMB506714

Primary electives(13 ec):

Specialisation Clinical Epidemiology	14	BMB504114
Specialisation Pharmacoepidemiology	14	BMB504214
Specialisation Infectious Diseases Epidemiology	14	BMB504314
Specialisation Occ and Env Epidemiology	14	BMB504414
Specialisation Veterinary Epidemiology	14	BMB504514

Profiles:
Students of this Master's programme can choose the following profiles:
- none

k. Infection and Immunity

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programma (none track)

Courses within the regular programma:

Mandatory courses (12 ec):

Symposium	1,5	BMB401905
Bacterial Pathogenesis	3	BMB404506
Signalling and techniques in I&I	4,5	BMB459007
Vaccines	3	BMB507410

Primary electives(3 ec):

Clinical Immunology	3	BMB404707
Virology	3	BMB430006

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics

- Complex systems
- Management
- Communication
- Education

l. Medical Imaging

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	20	BMB500417
Writing assignment	7,5	BMB463007
Free elective components	15	varied
Master's courses	25	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (20 ec):

Medical Image Formation	5	BMB501717
Team Challenge	5	BMB502317
Programming for Medical Imaging	5	BMB502417
Image Processing	5	BMB502817

Primary electives(5 ec):

Advanced MR Physics 1	5	BMB502717
Advanced MR Physics 2	5	BMB503317
Capita Selecta Medical Imaging	5	BMB502517
Capita Selecta Medical Image Analysis TU/e	5	BMB502217
Radioisotopes and ionizing radiation TU/e	2,5	BMB502117
Radiotherapy Physics	5	BMB502617
Radiation Physics TU/e	2,5	BMB503417
RF in MRI TU/e	2,5	BMB503117
Ultrasound in (Bio)medical Engineering TU/e	5	BMB503217

At least 5 credits (EC) has to be followed at the TU/Eindhoven.

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

m. Molecular and Cellular Life Sciences

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	GSLS-ACAD
Major research project	51	GSLS-MAJRP
Minor research project	33	GSLS-MINRP
Writing assignment	7,5	GSLS-WRIAS
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Genes to Organisms
- Molecules and Cells
- Biophysics & Molecular Imaging
- Computational Biology

Courses within the track Genes to Organisms[196]:

Mandatory courses:

Genes to Organisms	3	SK-MCG2O

Primary electives(mandatory courses from the list, 3 ec):

Molecules & Cells	3	SK-MCMC
Biophysics & Molecular Imaging	3	SK-MCBMI
Systems Biology	3	SK-MCCB

Secondary electives (Mandatory courses from the second list, 9 ec):

Biotechnology	5	B-MBITEC
Bioinformatics and evolutionary genomics	3	B-MBIEG06
Molecular plant physiology and biotechnology	7,5	B-MPPB05
Introduction to Bioinformatics for life sciences	3	B-MINBI08
Proteomics & Mass Spectroscopy	3	SK-MBAPBMS
Virology	3	BMB430006
Developmental Genetics	1,5	BMB506508
Microbial Genomics	3	B-MCMIGE
Introduction to Python for Life Science	1.5	BMB465014
Introduction to R for Life Science	1.5	BMB502214

Courses within the track Molecules and Cells[19]:

Mandatory courses:

Molecules & Cells	3	SK-MCMC

Primary electives(mandatory courses from the list, 3 ec):

Genes to Organisms	3	SK-MCG2O
Biophysics & Molecular Imaging	3	SK-MCBMI
Systems Biology	3	SK-MCCB

Secondary electives (Mandatory courses from the second list, 9 ec):

Light Microscopy	1,5	B-MLMIC
Structural Bioinformatics & Modelling	3	SK-MSTBIMO
Proteomics and Mass Spectrometry	3	SK-MAPBMS
Introduction to Bioinformatics for life sciences	3	B-MINBI08
Applied Protein Crystallography	3	SK-MBPPC
Biotechnology	5	B-MBITEC
Research in Intracellular Proces. and Cell Organis.	3	SK-INTRAPR
Virology	3	BMB430006
Design of anti-effective drugs	7,5	FA-441
Chemical Biology	7,5	FA-450
Application of Light and Electron Microscopy	3	NS-EX419M
Introduction to Python for Life Science	1.5	BMB465014
Introduction to R for Life Science	1.5	BMB502214

Courses within the track Biophysics & Molecular Imaging[196]:

Mandatory courses:

Biophysics & Molecular Imaging	3	SK-MCBMI

Primary electives(mandatory courses from the list, 3 ec):

Molecules & Cells	3	SK-MCMC
Genes to Organisms	3	SK-MCG2O
Systems Biology	3	SK-MCCB

Secondary electives (mandatory courses from the second list, 9 ec):

Adv. Biomolecular Mass Spectrometry	3	SK-MADPBMS
Advanced Biomolecular NMR	3	SK-MBABNMR
Advanced Protein Crystallography	3	SK-MBAPC
Structural Bioinformatics & Modelling	3	SK-MSTBIMO
Light Microscopy	1,5	B-MLMIC
Physics of Light and Electron Microscopy	4,5	NS-EX417M
Applied Protein Crystallography	3	SK-MBPPC

Courses within the track Computational Biology[19]:

Mandatory courses:

Systems Biology	3	SK-MCCB

Primary electives(mandatory courses from the list, 3 ec):

Molecules & Cells	3	SK-MCMC
Genes to Organisms	3	SK-MCG2O
Biophysics & Molecular Imaging	3	SK-MCBMI

Secondary electives (mandatory courses from the second list, 9 ec):

Master level Computational Biology	10	B-MCOBI
Bioinformatics and evolutionary genomics	3	B-MBIEG06
Advanced Omics for Life Sciences	1,5	BMB502316
Advanced Bioinformatics: Data Mining and Data Int.	1,5	BMB502114
Structural Bioinformatics & Modelling	3	SK-MSTBIMO
Introductory course quantitative biology	4,5	B-MQBIO

Profiles:
As replacement of the minor research project (possible extended with free elective components). Students of this Master's programme can choose the following profiles:

- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

n. Neuroscience and Cognition

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51[20]	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007

[20] Students of the master's programmes Neuroscience and Cognition and Drug Innovation are allowed to conduct a major research project of 42 credits and 9 credits in extra theoretical courses, subject to the approval of the programme coordinator.

Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Cognitive Neuroscience
- Experimental and Clinical Neuroscience

Courses within the track Cognitive Neuroscience[16]:

Mandatory courses (15 ec):

Fundamentals of Neurocience	15	BMB500103

Courses within the track Experimental and Clinical Neuroscience[16]:

Mandatory courses (15 ec):

Fundamentals of Neurocience	15	BMB500103

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

o. One Health

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (15 ec):

Basic principles of biostatistics, epidemiology and infection and immunity	1,5	BMB520817
Interdisciplinary Research in One Health	1,5	BMB519817
Introduction in One Health	15	BMB518817
Infectious Diseases and One Health	3	BMB521817
Mathematical Modeling of Infectious Diseases	3	BMB524817
Environmental Health	3	BMB521217
Risk Assessment and One Health	1,5	BMB523418

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics

- Complex systems
- Management
- Communication
- Education

p. Regenerative Medicine and Technology

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses (15 ec):

Intro to RMT	15	BMB508612

At least 5 Credits (EC) has to be followed at the TU/e within the free elective components.

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:
- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

q. Science and Business Management

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	GSLS-ACAD
Major research project	42-51[21]	GSLS-MAJRP
Business internship	27	GSLS-ISHIP
Free elective components	0-3	varied
Master's courses	40.5-49.5	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:
- Regular programme (no track)

Master's courses regular programme

Mandatory courses:

Introduction, return meetings and essay (oud)	2,5	AS-SP4M13
Orientation on Presentation and Career (nieuw)	2,5	B-MSBIRME
Economics	5	B-MSBECO
Entrepreneurship	5	B-MSBENSH

[21] Students of the Master's programme Science and Business Management are allowed to conduct a major research project of 42 credits and 9 credits in extra theoretical courses, of which at least 6 EC substantive courses, subject to the approval of the programme coordinator.

Financial Management	5	B-MSBFIMA
Marketing	5	B-MSBMAR
Operations Management	5	B-MSBOPMA
Organization & Strategic Management	5	B-MSBORBE
Business support activities	3	B-MSBFUFO

Primary electives(5-11 ec mandatory courses from the list):

Biotechnology	5	B-MBITEC
Metabolic pathways: from cell to disease	3	BMB501314
Essentials of Clinical Neuroscience	3	BMB416005
Mechanisms of disease	3	BMB501103
Introduction to stem cells	1,5	BMB509013
Understanding drugs	3	DI-407
Adsorption, Kinetics and Catalysis	7,5	SK-MAKC
Advanced Energy Analysis	7,5	GEO-2508

Every other GSLS/GSNS course that is connected to the research project, subject to the approval of the programme coordinator.

Profiles:
Students of this Master's programme can choose the following profiles:

- Bioinformatics, with deviated content: 42 ec major research project in the field of Bioinformatics and at least 12 ec electives of the Bioinformatics-profile (combined with 9 ec available from the major and 5 ec elective courses from SBM year 1).

r. Toxicology and Environmental Health

Component:	Credits (EC):	OSIRIS-code:
Introduction course + Life Sciences seminars[15]	1,5	BMB509718
Major research project	51	BMB500303
Minor research project	33	BMB500203
Writing assignment	7,5	BMB463007
Free elective components	12	varied
Master's courses	15	see below
Total	120	

Tracks:
Students of this Master's programme can choose the following tracks:

- Regular programme (no track)

Master's courses regular programme

Primary electives(15 ec):

Risk assessment and risk management	3	BMB500803
Health eff of chem and biol agents	6	BMB505507
Basic principles in toxicology and environmental health	1,5	BMB520717
Exposure science	4,5	BMB521717

Profiles:
As replacement of the minor research project (possible extended with free elective components).
Students of this Master's programme can choose the following profiles:

- Applied Data Science
- Bioinformatics
- Complex systems
- Management
- Communication
- Education

3. Composition profiles (ad art. 3.6 lid 5)

a. Applied Data Science

Replaces the minor research project (33ec)

Mandatory courses (25.5 ec):	**Credits (EC)**	**OSIRIS-code**
Data science & society	7,5	INFOMDSS
Data analysis & visualisation	7,5	201600038
Computational thinking	7,5	INFOMCTH
Portfolio assignment on an Applied Data Science topic	3	BMB525817
One of the following electives (7.5 EC):		
Knowledge management	7,5	INFOKMT
Advanced research methods	7,5	INFOARM
Seminar Medical informatics	7,5	INFOMSMI
Business Intelligence	7,5	INFOMBIN

b. Bioinformatics

- Standard Bioinformatics profile (33 EC)

Replaces the minor research project (33ec)

Mandatory components (24 EC):	**Credits (EC)**	**OSIRIS-code**
Introduction to bioinformatics for life sciences	3	B-MINBIO8
Introduction to python for life sciences	1,5	BMB465014
Introduction to R for Life sciences	1,5	BMB502214
Bioinformatics project	18	B-MBIPR
Primary electives (choose at least 9 ec from the list):		
Bioinformatics and evolutionary genomics	3	B-MBIEG06
Structural bioinformatics and modelling	3	SK-MSBM
Advanced R for Life sciences	1,5	B-MADR
Advanced Bioinformatics: data mining	1,5	BMB502114
Advanced Omics for life sciences	1,5	BMB502316
Introduction to research data management	3	B-MINRDM
Advanced analytics algorithms for omics	1.5	tbd
Microbial genomics	3	B-MCMIGE

- Extended Bioinformatics profile (45 EC)

Replaces the minor research project plus free elective components (45 ec)

Mandatory components:	**Credits (EC)**	**OSIRIS-code**
Introduction to bioinformatics for life sciences	3	B-MINBIO8
Introduction to python for life sciences	1,5	BMB465014
Introduction to R for Life sciences	1,5	BMB502214
Bioinformatics project	33	Code of own minor project
Primary electives(choose at least 6 ec from the list):		
Bioinformatics and evolutionary genomics	3	B-MBIEG06
Structural bioinformatics and modelling	3	SK-MSBM
Advanced R for Life sciences	1,5	B-MADR
Advanced Bioinformatics: data mining	1,5	BMB502114
Advanced Omics for life sciences	1,5	BMB502316
Introduction to research data management	3	B-MINRDM

c. Communication

Replaces the minor research project (33ec)

Mandatory components: (25 EC)	**Credits (EC)**	**OSIRIS-code**
Internship Product Development	20	FI-MSECIPD
Communicating Science with the Public	5	FI-MSECCSP

Primaire theoretical C-courses: at least 5 EC

Issues and Theories in SEC	5	FI-MSECITS
Designing EC	5	FI-MSECDEC
Science in Society	5	FI-MSECSIS
History and Philosophy for SEC	3.75	FI-MSECHPS
Innovation and Dissemination	3.75	FI-MSECID
Professional Skills and Identity	3.75	FI-MHPSPSI
Duurzaamheidseducation	3.75	GSTOKC03
Erfgoededucation	3.75	GSTOKC09

Electives GSLS: maximal 3 EC

Communicating Life Sciences	3	BMB503717
Science and Society	3	BMB507912
Societal challenges for life sciences(	3	BMB501917

d. Education

Replaces the minor research project (33ec)

1.Education- second degree teaching qualification (33 EC)

Mandatory components (30 EC):	**Credits (EC)**	**OSIRIS-code**
Professional in Practice 1a	10	GSTPIP1A
Professional in Practice 1b	10	GSTPIP1B
Subject Teaching Methodology 1	5	GSTVAKD1BI/ GSTVAKD1SK
Pedagogy 1	5	GSTPED1

Electives GSLS: maximal 3 EC

Communicating Life Sciences	3	BMB503717
Science and Society	3	BMB507912
Societal challenges for life sciences(	3	BMB501917

2.Education- <u>first degree</u> teaching qualification (33 EC)

Mandatory components (30 EC)		
Professional in Practice 2	10	GSTPIP2
Pedagogy 2	2,5	GSTPED2
Subject Teaching Methodology 2	7,5	GSTVAKD2BI/SK*
Pedagogical elective, choice from	5	GSTPKC01 – GSTPKC07
GST Elective, choice from	5	GSTOKC01 – GSTOKC10, FI-MSECSIS

Electives GSLS: maximal 3 EC

Communicating Life Sciences	3	BMB503717
Science and Society	3	BMB507912
Societal challenges for life sciences	3	BMB501917

e. Complex Systems

- Standard Complex systems profile (33 EC)

Replaces the minor research project (33ec)

Mandatory components (18EC):	**Credits (EC)**	**OSIRIS code**
Complex systems project	18	GSLS-COSYS

Primary electives(at least 7,5 ec):

Introduction to Complex Systems	7,5	WISM484
Toy Models	7,5	SK-MTOYM
Master level computational Biology	7,5	B-MCOBI

Secondary electives (0-7,5 ec):

Advanced bioinformatics: data mining and data integration for life sciences	1,5	BMB502114
Crowd simulation	7,5	INFOMPAP
Introductory course quantitative biology	4,5	B-MQBIO

Introduction to Bioinformatics for molecular biologists	3	B-MINBIO8
Seminar mathematical epidemiology	7,5	WISM436
Seminar modelling health effects of ionizing radiation	7,5	WISM409
Sociological theory construction and model building	7,5	200400064
Understanding Complexity: Economy and the Planet	7,5	NS-MO450M
Advanced self-organisation of social systems	5	(Groningen University: I0801)

- Extended Complex systems profile (45 EC)
Replaces the minor research project plus Free elective components (45ec)

Mandatory components (33 EC):

Complex systems project	33	Code from own minor project

Primary electives(at least 7,5 ec):

Introduction to Complex Systems	7,5	WISM484
Toy Models	7,5	SK-MTOYM
Master level computational Biology	7,5	B-MCOBI

Secondary electives (0-4.5 ec):

Advanced bioinformatics: data mining and data integration for life sciences	1,5	BMB502114
Crowd simulation	7,5	INFOMPAP
Introductory course quantitative biology	4,5	B-MQBIO
Introduction to Bioinformatics for molecular biologists	3	B-MINBIO8
Seminar mathematical epidemiology	7,5	WISM436
Seminar modelling health effects of ionizing radiation	7,5	WISM409
Sociological theory construction and model building	7,5	200400064
Understanding Complexity: Economy and the Planet	7,5	NS-MO450M
Advanced self-organisation of social systems	5	(Groningen University: I0801)

f. Management
Replaces the minor research project (33ec)

Mandatory components (33 EC):	**Credits (EC)**	**OSIRIS-code**
Economics	5	B-MSBECO
Organization & Strategic Management	5	B-MSBORBE
Operations Management	5	B-MSBOPMA
Marketing	5	B-MSBMAR
Financial management	5	B-MSBFIMA
Entrepreneurship	5	B-MSBENSH
Future forward	3	B-MSBFUFO