Appendices to the Teaching and Examination Regulations 2015-2016

Appendix A. Teaching outcomes of the degree programme* (art. 1.3)

The graduate:

1A (Biology) has acquired in depth knowledge on one or more scientific disciplines within the general field of Biology and can use this knowledge to explain in detail the relevant concepts, using the appropriate terminology.

1B (Ecology & Evolution) has acquired in depth knowledge on one or more scientific disciplines within the field of Ecology and Evolution and can use this knowledge to explain in detail the relevant concepts, using the appropriate terminology.

1C (Marine Biology) has acquired in depth knowledge on one or more scientific disciplines within the field of Marine Biology and can use this knowledge to explain in detail the relevant concepts, using the appropriate terminology

1D (Molecular Biology & Biotechnology) has acquired in depth knowledge on one or more scientific disciplines within the field of Molecular Biology & Biotechnology and can use this knowledge to explain in detail the relevant concepts, using the appropriate terminology

2 can design and conduct scientific research;

3 can independently investigate and critically evaluate scientific literature;

4 can identify new developments in the relevant disciplines, and can become familiar with these developments;

5 can systematically organize his/her work in scientific research and formulate realistic and original solutions to complex problems;

6 can participate in and contribute to a multidisciplinary team;

7 can effectively communicate acquired knowledge, insights and skills to others, both in writing and in oral presentation;

8 can identify societal and ethical implications of scientific research and is able to critically reflect on his/her actions in this context;

9 can independently acquire new knowledge and skills that are relevant for his/her professional career, in science, in policy & management or society.

* These are based on the taxonomy of Bloom

Appendix B. Specializations of the degree programme

(art. 2.2)

1. Within the degree programmes, the student chooses one of the following profiles:
    a. R-profile ("Research-profile", p-variant in Dutch), which provides training as a researcher;
    b. SBP-profile ("Science, Business and Policy -profile", m-variant in Dutch),which prepares for professions in a societal, political and/or commercial context.
2. Within the degree programme Biology students can follow the specialization Behavioural and Neurosciences, which prepares for conducting research in this field of biology.

Within the degree programme Ecology & Evolution qualified students can follow the Top programme Evolutionary Biology, an intensified programme which prepares for conducting top quality research in this field of ecology.

Within the degree programme Ecology & Evolution qualified students can follow the Erasmus Mundus programme Evolutionary Biology, an intensified European programme which prepares for conducting top quality research in this field of ecology. For this programme the Erasmus Mundus Teaching and Examination Regulations will apply.

Within the degree programme Molecular Biology & Biotechnology qualified students can follow the Top programme Biomolecular Sciences, an intensified programme which prepares for conducting top quality research in this field of molecular biology and biotechnology

Within the degree programme Molecular Biology & Biotechnology students can follow the specialization Chemical biology

Appendix C. Content of the degree programme

(art. 2.3)

The degree programmes consist of either the R- or the SBP-profile programme:

R- Profile:

Study elements	ECTS	entry requirements
research project (RP)*	40 or ≥	-
research project (RP)*	30 or ≥	-
colloquium	5	RP
essay	5	-
compulsory master courses	20	see appendix D
electives**	≤20	see appendix D

SBP-Profile:

Study elements	ECTS	entry requirements
research project (RP)*	40 or ≥	-
compulsory master courses	5	see appendix D
colloquium	5	RP
internship SBP	40	RP
Science and Business	10	-
Science and Policy	10	
electives**	≤ 10	see appendix D

In addition to the above scheme to following rules apply to all programmes:

- The student chooses a mentor - an assistant professor or professor from the list of each Master programme- to advise and discuss the contents of the individual degree programme before approval of the Board of Examiners.

- * The first research project (preferably the one ≥40 EC) must be performed at the FMNS (within life sciences oriented research groups) or the UMCG under supervision of one of the examiners.

- ** The student may choose to use 5, - 20 ECTS to extend a research project, prepare a manuscript (no more than 10 ECTS), attend master courses (appendix D), to include a maximum of 10 ECTS of courses from other relevant Life Sciences programmes, to repair specific deficiencies or perform a research assignment of 5-20 ECTS. During the mid-term assessment one may extend the research project with only 5-10 ECTS.

- Research projects, colloquium and essay must deal with different subjects, be supervised by a different examiner, and be approved of by the Board of Examiners.

3. **Additional requirements for the specialization *Behavioural and Neurosciences*** (Master Biology)

Students within the specialization *Behavioural and Neurosciences* choose their mentor from the list for this specialization.

4. **Additional requirements for the Top programme *Evolutionary Biology*** (Master Ecology and Evolution)

4.1 Students within the Top programme Evolutionary Biology have to pass the following Top programme courses*:

* These courses are challenging both in content and time constraints

- Evolutionary ecology research; 10 ECTS
- Evolutionary theory 10 ECTS
- Genomics in ecology and evolution; 10 ECTS

4.2. Two seminar series of 2 ECTS each are required. These are chosen from a list of the "current/classic themes" seminar series.

4.3 The essay in this case is a literature study written in the form of a review article or a research proposal.

4.4 The study load of the electives is ≤ 6 ECTS which can be used for courses, research or individual assignments

5. **Additional requirements for the MEME programme Evolutionary Biology (Master Ecology and Evolution)** are described in Annex C_MEME

6. **Additional requirements for the Top programme *Biomolecular Sciences*** (Master Molecular Biology and Biotechnology)

6.1 Students within the Top programme Biomolecular Sciences generally follow the P-profile scheme but have to pass 6 out of the following Top programme courses*:

* These courses are challenging both in content and time constraints

1. Advances in signal transduction; 5 ECTS
2. Advanced Membrane Biology; 5 ECTS
3. Organelle and membrane biogenesis; 5 ECTS
4. Molecular Dynamics and modeling of Membranes and Proteins ; 5 ECTS
5. Protein and Enzyme Engineering by Mutagenesis and Directed Evolution; 5 ECTS
6. Advanced protein crystallography; 5 ECTS
7. Tools and approaches of systems biology; 5 ECTS
8. DNA microarray analysis; 5 ECTS

6.2 Literature study written in the form of a research proposal; 5 ECTS.

6.3 The study load of the electives is ≤ 10 ECTS which can be used for courses, research or individual assignments

7. Students within the degree programme Marine Biology may use the title *Marine Scientist of the Netherlands* when they have fulfilled the requirements of their programme and passed one of the annual field courses organized by the NIOZ, the Royal Netherlands Institute for Sea Research (Texel).

8. **Additional requirements for the specialization *Chemical biology*** *(*Master Molecular Biology and Biotechnology)

8.1 Students within the specialization Chemical biology generally follow the P-profile scheme but have to pass 4 of the following courses:

1. Advanced protein crystallography; 5 ECTS
2. Protein and Enzyme Engineering by Mutagenesis and Directed Evolution; 5 ECTS
3. Advances in Chemical Biology; 5 ECTS
4. Synthetic Biology & Systems Chemistry; 5 ECTS

9. **Additional requirements for the programme *Marine Biology***

1. Principals of Biological Oceanography; 5 ECTS
2. Principals of Marine Biology; 5 ECTS
3. Principals of Marine Conservation; 5 ECTS

Appendix D. Courses (art. 2.4) **plus Appendix E. Entry requirements and compulsory order of examinations**

(art. 3.2)

The following list presents compulsory master courses and electives[1]. The column on the right indicates the master programmes for which the courses were developed in particular. B: Biology, BN: specialization Behaviour and Neurosciences in the study programme Biology, EE: Ecology and Evolution, MB: Marine Biology, MBB: Molecular Biology and Biotechnology. Presumed knowledge refers to FMNS bachelor courses (see ocasys for description of the content).

[1] 'compulsory master courses' may only be filled with courses from the list master courses while 'Electives' may be courses from both the list master courses and elective master courses.

Master Courses

General master courses within the school of Life Sciences:

Course	ECTS	Presumed knowledge	programme
Animal and human experimentation: Design, Practice and Ethics	5	a supervisor approved planning of a master subject involving human or animal experimentation is needed	B, BN, EE, MB, MBB
Orientation on International Careers	5	-	B, BN, EE, MB, MBB
Radioisotopes in experimental biology	5	-	B, BN, EE, MB, MBB
Advanced statistics	5	Biostatistiek	B, BN, EE, MB, MBB
Programming C++ for biologists	5	-	B, BN, EE, MB, MBB
Advanced light microscopy	5	-	B, BN, EE, MB, MBB
VMT	1		BN
Professionalism and Ethics in Science	5		B, BN, EE, MB, MBB
Practical Bioinformatics for Biologists	5	-	B, BN, EE, MB, MBB

Master courses organised by the research institutes GELIFES and GUIDE *:*

Course	ECTS	entry requirements	programme
Advanced imaging techniques	5	-	B, BN, MBB
Neurodegenerative diseases	5	Integratieve neurobiologie	B, BN
Behavioural pharmacology	5	-	B, BN
Introduction to the Behavioural and Cognitive Neurosciences	4	-	B, BN
Current themes in inflammation and cancer	5	ImmunologieI	B, BN, MBB
Advanced metabolism & nutrition	5	Metabolisme & Voeding or integratieve neurobiologie	B, BN
Current themes in healthy aging	5	-	B, BN, MBB
Stem cells & regenerative medicine	5	Regenerative Medicine or MB&MB, or ImmunologieI	B, MBB
Immunology: from bedside to bench and back	5	Immunologie I+II	B
Molecular biology of ageing and age-related diseases	5	-	B, BN, MBB

Master courses organised by the research institute GELIFES and ESRIG:

Course	ECTS	entry requirements	programme
Current themes seminar series	2	-	B, EE, MB
Groningen lectures in theoretical biology	2-6	-	B, BN, EE, MB
GELIFES lectures	2	-	B, EE, MB
Mathematical models in ecology and evolution	6	Biomathematica	B, BN, EE, MB

A Primer in Population Genetic Modeling (not in 2015-2016)	5	Students admitted in B, MB or EE	B, EE, MB
Advanced selforganisation, of social systems	5	-	B, EE, MB,
Ecosystems Mediterranean rocky shores	10	Biological oceanography + Marine Biology (& ecology)	MB
Meta- analyses in Ecology*	5	Bachelor Biology, major B, EE or MB	B, EE, MB
Polar ecosystems	5	Students admitted in B, MB or EE	B, EE, MB
Molecular methods in ecology & evolution	10	Students admitted in B, MB or EE	B, EE, MB
Research proposal Ecology and Evolution	5	Students admitted in B, MB or EE	B, EE, MB
Flyway ecology	5	Students admitted in B, MB or EE	B, EE, MB
Genetics in Conservation and Ecology	5	Students admitted in B, MB or EE	B, EE, MB
Evolutionary ecology of marine organisms	5	Students admitted in B, MB or EE	B, EE, MB
Marine ecosystem service & global change	5	Students admitted in B, MB or EE	B, EE, MB
Numerical modelling marine biologists	5	-	B, EE, MB

Master courses organised by the research institute GBB:

Course	ECTS	entry requirements	programme
Advanced protein crystallography	5	For students Biomolecular Sciences/Chemical biology	B, MBB
Protein crystallography 2	5	Advanced protein crystallography	B, MBB
Multidimensional NMR 1	5	Biochemie en Biofysische Chemie	B, MBB
Multidimensional NMR 2	5	MDNMR 1	B, MBB

Electron microscopy of biological macromolecules	5	-	B, MBB
DNA microarray analysis	5	For students Biomolecular Sciences	B, BN, EE, MB, MBB
Advances in signal transduction	5	For students Biomolecular Sciences	B, MBB
Advanced Membrane Biology	5	For students Biomolecular Sciences	B, MBB
Organelle and membrane biogenesis	5	For students Biomolecular Sciences	B, MBB
Molecular dynamics and modeling of membranes and proteins	5	For students Biomolecular Sciences	B, MBB
Protein and enzyme engineering by mutagenesis and directed evolution	5	For students Biomolecular Sciences/Chemical biology	B, MBB
Tools and approaches of systems biology	5	For students Biomolecular Sciences	B, MBB
Biocatalysis & Green chemistry	5	Bio-organische Chemie	B, MBB
Topics in enzymology	5		B. BMS, MBB, MPS
Advanced genetic engineering and complex gene regulatory circuitries	5		B, MBB

Master courses organised by Science & Society:

Compulsory for the SBP profile, elective for the R profile	ECTS	entry requirements	programme
Science & Business	10,	-	B, BN, EE, MB, MBB
Science & Policy	10	-	B, BN, EE, MB, MBB

Master course organised by Spatial Sciences:

Course	ECTS	entry requirements	programme
Transitions in water management	5	-	B, MB

Master course organised by the Arctic Centre:

Course	ECTS	entry requirements	programme
Sustainability at the Polar Regions	5	-	B, MB, EE

Electives:

Elective master courses organised by Energy and Environmental sciences:

Course	ECTS	entry requirements	programme
Impacts of Energy and Material Systems (IEMS)	5	-	B, EE, MB
Functioning & Productivity of Ecosystems (FPE)	5		B, EE, MB
Sustainability & Society	5	IEMS, FPE	B, EE, MB
Systems Integration and Sustainability	5	IEMS, FPE	

Elective master courses organised by Education and Communication[a]:

Course	ECTS	entry requirements	programme
Vaardigheden Wetenschapseducatie en -communicatie	5	-	B, BN, EE, MB, MBB
Ontwerpen van/voor Wetenschapseducatie en Communicatie	10	-	B, BN, EE, MB, MBB
Wetenschap in beeld	5	-	B, BN, EE, MB, MBB
Wetenschapsvoorlichting en –journalistiek	5	Vaardigheden Wet. educ. & com	B, BN, EE, MB, MBB
Inleiding Onderzoeksmethoden Wetenschapseducatie en –communicatie	5	Vaardigheden Wet. educ. & com and Research Project	B, BN, EE, MB, MBB
Achtergronden bèta-onderzoek	10	Vaardigheden Wet. educ. & com and Research Project	B, BN, EE, MB, MBB

Elective master courses organised by The Donald Smits Center for Information Technology:

Course (max 2 ects per individual programme^)	Half day unit	entry requirements	programme
Access basic	5	-	B, BN, EE, MB, MBB
Excel basic	5	-	B, BN, EE, MB, MBB
Excel data bases en draaitabellen[a]	1	-	B, BN, EE, MB, MBB

*For entry requirements see module description in Ocasys
[a] These modules are instructed in Dutch
^ A minimum of 5 half day units is required for a study load of 1 ECTS, for 2 ECTS 11 units are needed. These courses have a student fee.

Elective master courses organised by Chemistry:

Course	ECTS	entry requirements	programme
Modern laser microscopy	5	-	B, MBB
Advances in Chemical Biology (Advances in Molecular Chemistry)	5	For students Chemical biology-	B, MBB
Synthetic Biology & Systems Chemistry	5	For students Chemical biology-	

Appendix F. Admission to the degree programme and different specializations (art. 4.1.1 + art. 4.2)

Requirements for admission to the master's degree in Biology

1. Holders of a Bachelor's degree in Biology from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Biology on that basis. Holders of a Bachelor's degree in Life Science & Technology from the University of Groningen with the majors *Biomedische wetenschappen*, *Gedrag & Neurowetenschappen* of *Moleculaire levenswetenschappen* will be admitted to the Master's degree programme in Biology on that basis. Holders of a Bachelor's degree with the major *Gedrag & Neurowetenschappen* from the University of Groningen will be admitted to the specialization programme Behavioural and Neurosciences within this master's degree programme in Biology.

2. Requirements for admission to the master's degree in Ecology and Evolution
Holders of a Bachelor's degree in Biology from the University of Groningen with the major *Ecologie & Evolutie* or *Mariene Biologie* are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Ecology & Evolution on that basis.

3. Requirements for admission to the master's degree in Marine Biology
Holders of a Bachelor's degree in Biology are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Marine Biology on that basis. For holders of another relevant Bachelor's degree in science there is an individual admission procedure based on the content of the bachelor's programme.

4. Requirements for admission to the master's degree in Molecular Biology and Biotechnology

- Holders of a Bachelor's degree in Biology or a Bachelor's degree in Life Science & Technology from the University of Groningen with the major *Moleculaire Levenswetenschappen*, major *Biomedische wetenschappen* or the combination of the major *Gedrag en Neurowetenschappen* and the minor *Moleculaire Levenswetenschappen*, are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Molecular Biology and Biotechnology on that basis.
- Holders of a Bachelor's degree in Chemistry with the major *Chemistry of Life* are admitted to this master's programme.

5. Admission requirements to specializations and Top programmes

In addition to the provisions in 4, the following admission requirements apply to the specialization or Top programmes:

1. Master Biology, specialization *Behavioural and Neurosciences*: A Bachelor's degree in Biology or a Bachelor's degree in Life Science& Technology of the University of Groningen with major *Gedrag en Neurowetenschappen*.
2. Master Ecology and Evolution, Top programme *Evolutionary Biology*: a relevant Bachelor's degree and an individual selection procedure (see below). Excellent MSc students from Ecology & Evolution and Marine Biology may apply during their first year for the Top Programme Evolutionary Biology.
3. Master Molecular Biology and Biotechnology, Top programme *Biomolecular Sciences* : a relevant Bachelor's degree and an individual selection procedure (see below).

6. Applications procedure for a Top programme (art. 4.2)

1. Students in possession of an admission permit can be admitted to the top programme.

2. Students who meet the requirements are provided with an admission permit by the Admission Board.

3. An admission permit is only valid for the academic year following the academic year in which the permit is granted.

4. There may be other conditions attached to the admission permit. The requirements must be met before the top programme has started.

5. The admission requirements comprise:
- a relevant bachelor's degree;
- sufficient knowledge of the English language;
- sufficient knowledge of the relevant sciences;
- a suitable attitude, motivation and talent to follow the Top programme.

6. The Board of Examiners establishes an Admissions Board that judges the student's fulfilment of the requirements. This Board consists of three members of the top programme's Board of Examiners, completed by a university employee. One of the members is appointed as chairperson.

7. The decisions of the Admissions Board can be appealed to at the Board of Appeal for Examinations.

8. Students apply to the admission procedure by sending in the following documents:
- a completed application form;
- a complete *curriculum vitae*;
- a survey of the study results attained in academic courses so far;
- a letter in which the student states why s/he wants to follow this top programme in particular, what his/her expectations and ambitions are;
- (if desired) results of former research projects, like reports or articles;
- the names of three scientists willing to provide personal information on the applicant;
- (if desired) other documents that the student thinks useful in furthering his/her application.

These documents are to be sent to the Faculty of Mathematics and Natural Sciences before the deadline (see appendix G) .

9. Proficiency in English is an admission requirement for most master's programmes. You will need to submit proof of proficiency of English as part of the admission process,

Exemptions
This requirement does not apply if you:
- are a native speaker and completed secondary education in any one of the following countries: Canada, USA, UK, Ireland, New Zealand, Australia
- have completed your bachelor education in any one of the following countries: Canada, USA, UK, Ireland, New Zealand, Australia
- have an International Baccalaureate
- have a European Baccalaureate diploma

Accepted test

- The International English Language Testing System (IELTS). Minimum score: 6.5 and all sections should be at least 6.0.
- The Test of English as a Foreign Language (TOEFL). Minimum total score: 580 and minimum section score 56 (paper-based) / 237 – 22 minimum section score(computer-based) / 92 and 21 minimum section score (Internet-based) for most master's programmes.
- Cambridge Certificate of Proficiency in English

Important notes

- The certificates need to be recent: not older than 2 years.
- The modality required is "academic".
- We do not accept institutional scores, with the exception as mentioned below.
- Chinese Students need to submit an IELTS or a TOEFL iBT test.

From 1 September 2008, Chinese students will be eligible to apply to study in Holland using a TOEFL score, confirmed by Neso China. Chinese students need to apply for the Neso certificate, which is an obligatory document for the study visa. Students can apply for the certificate at the same time as applying to the university.

- ONLY Indonesian applications are permitted to submit an Institutional TOEFL score, under the following conditions:
  1. The application for admission to our study programmes have been sent to us by NESO Jakarta and includes the statement of Neso Jakarta on the procedures of the ITP TOEFL test organised by Neso Jakarta, TOEFL and the Indonesian International Education Foundation.
  2. The minimum score for TOEFL is: 580 (paper-based) / 237 (computer-based) / 92 (Internet- based).
  3. The ITP TOEFL score must be an equivalent of the official TOEFL scores as mentioned under condition 3.

10. The applicants will be informed in writing about the decision on their admission within 3 weeks after the deadline for submission. This may be a tentative decision, conditional on further information to be supplied by the candidate.