

Appendices to the Teaching and Examination Regulations 2022-2023

Appendix I. Learning outcomes of the degree programme Biology* (art. 1.3)

The graduate:

1. a) 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
- b) has acquired cross disciplinary knowledge of issues across scientific disciplines within the field of Biology and can use this knowledge to explain current societal and scientific challenges;
2. can design, and conduct scientific research, and systematically organize his/her work in 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 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 II. Tracks/Specializations of the degree programmes

(art. 2.2)

1. Within the degree programme Biology, the student chooses one of the following tracks:
 - a. Research-track (R-track), which provides training as a researcher.
 - b. Modelling in the Life Sciences-track (M-track), which provides training as a researcher with a focus on modelling.
 - c. Science, Business and Policy track, (SBP-track), which prepares for professions in a societal, political and/or commercial context.

**Appendix III. Content of the degree programme
(art. 2.3)**

The degree programme consists of one of the following tracks:

Research-Track:

Study elements	Course code	ECTS	entry requirements
research project (RP)*	WMBY901-xx	40 or ≥	see appendix V
research project (RP)*	WMBY902-xx	30 or ≥	see appendix V
colloquium	WMBY020-05	5	RP
essay	WMBY021-05	5	-
compulsory master courses		20	see Ocasys
electives**		≤20	see Ocasys

Modelling in the Life Sciences-Track:

Study elements	Course code	ECTS	entry requirements
research project (RP)* @	WMBY901-xx	40 or ≥	see appendix V
research project (RP)* @	WMBY902-xx	30 or ≥	see appendix V
colloquium	WMBY020-05	5	RP
essay	WMBY021-05	5	-
Mathematics in the Life Sciences	WMBY006-05	5	
Biological Modelling and Model Analysis	WMBY005-10	10	Mathematics in the Life Sciences or equivalent
Programming C++ for Biologists	WMBY010-xx	5/10	
electives**		≤20	see Ocasys

@ At least one research project focusing on modelling in one of the domains of Life Science.

Science Business and Policy-Track:

Study elements	Course code	ECTS	entry requirements
research project (RP)*	WMBY901-xx	40 or ≥	see appendix V
compulsory master course		5	see Ocasys
colloquium	WMBY020-05	5	RP
Work placement Business & Policy	WMSE901-40	40@	RP
Introduction Science and Business	WMSE001-10	10	
Introduction Science and Policy	WMSE002-10	10	
electives**		≤ 10	see Ocasys

@Part of the skills work placement SBP is taught at the UG

In addition to the above scheme, the following rules apply:

- The student chooses a mentor from the list of Biology to get advice on and discuss the contents of the individual degree programme before requesting approval from the Board of Examiners.
- * The first research project (preferably the one ≥ 40 EC) must be an internal project. Internal projects must be performed at the FSE (within Life Sciences-oriented research groups), the University Medical Centre Groningen or the Netherlands Institute for Sea Research, under supervision of one of the examiners of the degree programme.
- The subject of the SBP work placement and the compulsory master courses must be clearly related to the scientific domain of the chosen master programme (see Appendix I, 1). Therefore, two examiners must be involved in the assessment of the internship: one SBP-examiner and one appointed examiner of the master programme.
- ** The student may choose from the onset to use 5, 10, 15 or 20 ECTS to extend a research project, prepare a manuscript related to a master research project (no more than 10 ECTS, the assessment will be Pass or Fail), attend master courses (appendix IV), include a maximum of 10 ECTS of courses from other relevant Life Sciences programmes, and/or repair specific deficiencies or perform a research assignment of 5, 10, 15 or 20 ECTS. During the mid-term assessment, one may extend the research project with only 5 or 10 ECTS.
- Research projects, colloquium and essay must deal with different subjects, and be approved of by the Board of Examiners.
- Research projects 1 and 2 must be supervised by a different examiner. In addition, it is advisable that research projects, colloquium and essay all are supervised by different examiners.
- The course unit Animal Experimentation is mandatory for students planning to participate in an "animal experiment" as defined by law (directive 2010/63/EU) during their research project work.

Appendix IV. Courses (art. 2.4)

Master courses and electives

The following lists present study elements that can be chosen as 'master courses' and 'electives'.

Master courses

The following list presents study elements that can be chosen as part of the 'master courses' (unless stated differently). After consultation with the study mentor and approval of the Board of Examiners (use BoE form on student portal) students may also choose from options available from other departments, other universities in the Netherlands or even abroad. In case the 'master courses' in an individual programme are completely filled, additional master courses may be chosen, which will automatically be part of the 'electives'.

Master courses organised by the research institutes GELIFES and ESRIG:

Course	Course code	ECTS
Advanced Statistics	WMBY018-06	6
Animal Experimentation*	WMBY019-05	5
Biological Modelling and Model Analysis	WMBY005-10	10
Ecology of Sustainable Farming (<i>biennial, does not run in 2022/2023</i>)	WMEV009-05	5
Flyway Ecology (<i>biennial, runs in 2022/2023</i>)	WMEV010-05	5
Mathematical Models in Ecology and Evolution	WMEV013-06	6
Mathematics in the Life Sciences	WMBY006-05	5
Marine Ecosystem Service & Global Change	WMMB008-05	5
Meta-analyses in Ecology (<i>biennial, runs in 2022/2023</i>)	WMBY013-05	5
Molecular Methods in Ecology & Evolution	WMEV007-10	5/10
Orientation on International Careers	WMBY014-05	5
Practical Computing for Biologists	WMBY008-05	5
Practical Modelling for Biologists	WMBY009-05	5
Programming in C++ for Biologists **	WMBY010-10	5/10
Polar ecosystems	WMMB009-05	5
Research proposal Ecology and Evolution***	WMEV012-05	5
Skills and Scopes in Biology	WMBY007-05	5

* Course unit only possible in combination with an MSc research project involving animals.

** Students who have already followed similar courses during their bachelor's degree, will be given a deepening version of the course more tailored to their individual background knowledge and skills.

*** Students MSc Ecology and Evolution have priority in enrolment.

Master courses organised by the research institute GBB:

Course	Course code	ECTS
Advanced light microscopy	WMBY016-05	5
Advanced Membrane Biology*	WMBS007-05	5
Advanced genetic engineering and complex gene regulatory circuitries*	WMBS006-05	5
Advances in signal transduction*	WMBS009-05	5
Advanced protein crystallography*	WMBS008-05	5
Biocatalysis & Green chemistry	WMCH027-05	5
Electron microscopy of biological macromolecules	WMBS011-05	5

Molecular dynamics and modelling of membranes and proteins*	WMBS003-05	5
Organelle and membrane biogenesis	WMBS012-05	5
Radioisotopes in experimental biology	WMBY011-05	5
Tools and approaches of systems biology*	WMBS005-05	5
Transcriptomics: DNA microarrays and RNAseq*	WMBS014-05	5
iGEM (International Genetically Engineered Machine competition)**	WMBS013-xx	≤20

* Students MSc Biomolecular Sciences have priority in enrolment.

** Selection for this course takes place in wintertime, an advertisement about application details is announced via Nestor and other means during the academic year.

Master courses organised by Science & Society:

Course	Course code	ECTS
Introduction to Science & Business [#]	WMSE001-10	10
Introduction to Science & Policy [#]	WMSE002-10	10

[#] Students who follow the R-track may only choose these courses as part of the 'electives', not as part of the 'master courses'.

Electives

The following lists presents study elements that can only be chosen as 'electives'. After consultation with the study mentor and approval of the Board of Examiners, students may also choose from options available from other departments, other universities in the Netherlands or even abroad.

Electives organised by Biomedical Sciences/GELIFES:

Course	Course code	ECTS
Applied Statistics and Machine Learning	WMBM024-05	5
Big Data and Applications in Biomedicine	WMBM025-05	5
Data Science in Biomedicine	WMBM023-05	5
Microbiological safety	WMMP004-01	1

Elective master courses organised by Energy and Environmental sciences*:

Course	Course code	ECTS
Impact of Energy and Material Systems	WMEE002-05	5
Sustainable Use of Ecosystems	WMEE003-05	5
Sustainability & Society	WMEE005-05	5
Systems Integration and Sustainability	WMEE006-05	5

* Students MSc Energy and Environmental Sciences have priority.

Elective organised by Royal Netherlands Institute of Sea Research:

Course	ECTS
NIOZ Marine Masters' Summer Course	4

Electives organised by Education and Communication*:

Course	Course code	ECTS
Research Methods in Science Education and Communication	WMEC005-05	5
Skills in Science Communication (2a only)	WMEC006-05	5

*Students MSc Science Education and Communication have priority in enrolment.

Elective master courses organised by Teacher Education**

Course	Course code	ECTS
Basiscursus Master Lerarenopleiding	TEM0105	5
Masterstage 1 Lerarenopleiding	TEM0205	5

** Dutch-speaking students only.

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

Course (max 2 ECTS per individual programme^)	½ day unit^
Access basic	5
Excel basic	3
Excel advanced	5

^ 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 additional costs (at a low fee for students), which are at the student's own expenses. These courses are not available in Ocasys. Please consult the Donald Smits Center for further information, time schedules and enrolment details.

Appendix V. Compulsory order of examinations (art 3.4)

Course unit	Entry requirement
Colloquium	Research project
Research project 2	Research project
Work placement Business & Policy	Research project, Introduction Science & Policy, Introduction Science & Business
Biological Modelling and Model Analysis	Mathematics in the Life Sciences or equivalent

Appendix VI. Admission to the degree programmes 2022/2023

(art. 2.1A.1 + 2.1B.1)

1. Requirements for admission to the master's degree in Biology

Holders of the following Bachelor's degrees 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 Biology from the University of Groningen or other Dutch research universities;
- Holders of a Bachelor's degree in Life Science & Technology (old curriculum, prior to 2020/2021) from the University of Groningen with the majors *Biomedical Sciences*, *Behaviour and Neurosciences* or *Molecular Life Sciences* will be admitted to the Master's degree programme in Biology on the basis of a Research project (10 EC) and Bachelor thesis (5 EC) in the discipline of interest.
- Holders of a Bachelor's degree in Life Science & Technology (new curriculum from 2020/2021 onwards) from the University of Groningen on the basis of a Research project (10 EC) and Bachelor thesis (5 EC) in the discipline of interest (major Ecology and Evolution, major Molecular Life Sciences) combined with at least 15 EC from this course list:

- Systems Ecology & Ecological Interactions 1 *
- Systems Ecology & Ecological Interactions 2 *
- Integrative Neuroscience
- Molecular Genetics
- Bioinformatics
- Chronobiology
- Modelling Life ***
- Behavioural Biology *
- C++ for Biologists
- Genes & Behaviour *
- Conservation Biology *
- Host-microbe Interactions
- Immunology
- Biostatistics II (obligatory for Research project in EE) * / ***
- Big Data Management in Ecology and Evolution
- Bioanalytical and Omics Techniques **
- Evolutionary Processes
- Evolution and Development
- Evolutionary Medicine
- Biology of Human Behaviour
- Marine Biology
- Cell Migration and Communication **
- Practical Carrousel **
- Evolutionary and Ecological Genomics *
- Integrative Biology
- Microbiome * / **
- Self-organization * / ***

* - Suggested for students who wish to focus on ecology and behavior in the SBP or Research-track.

** - Suggested for students who wish to focus on molecular biology in the SBP or Research-track.

*** - Suggested for students who wish to enter the Modelling in the Life Sciences-track.

For holders of another relevant academic Bachelor's degree in life sciences there is an individual admission procedure based on the content of the bachelor's programme and language skills, see <https://www.rug.nl/fse/programme/admissions/msc/language-requirements>.

It is possible to appeal to the decision of the admission board via standardized procedures at the University of Groningen.

Appendix VII Transitional provisions (art. 7.1)

Non-applicable

Appendix VIII Additional Requirements Open degree Programmes (Art. 5.6)

In exceptional circumstances students wishing to pursue an open degree programme may file a request with the Board of Examiners. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme and can determine further conditions in their rules and regulations.

Appendix IX

Application and decision deadlines for admission

See art. 2.6.1 and 2.6.3 of basic TER