

Appendices to the Teaching and Examination Regulations 2019-2020

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

The graduate:

- 1 has acquired in depth knowledge on one or more scientific disciplines within the field of Biomolecular Sciences 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 II. Tracks/Specializations of the degree programmes

(art. 2.2)

1. Within the degree programme Biomolecular Sciences students can follow the specialization Chemical Biology

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

The degree programmes consist of:

Study elements	ECTS	entry requirements
<i>Protein and Enzyme Engineering</i>	5	
3 compulsory master courses [#]	15	see Ocasys
research project (RP)*	40 or ≥	see appendix V
research project (RP)*	30 or ≥	see appendix V
colloquium	5	RP
essay	5	-
electives**	≤20	see Ocasys

In addition to the above scheme the following rules apply:

- The student chooses a mentor - from the list of Biomolecular Sciences – to get advise on 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 an internal project. Internal projects must be performed at the FSE (within Life Sciences-oriented research groups) or the University Medical Centre Groningen under supervision of one of the examiners of the degree programme.
- ** The student may choose 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), 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, 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, be supervised by a different examiner, and be approved of by the Board of Examiners.
- #Students have to pass 3 courses out of the following courses:
 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. Advanced protein crystallography; 5 ECTS
 6. Tools and approaches of systems biology; 5 ECTS
 7. Transcriptomics: DNA microarrays and RNAseq; 5 ECTS
 8. Advanced Genetic Engineering and complex gene regulatory circuitries; 5 ECTS

Additional requirements for the specialization *Chemical biology*

Students have to pass 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

Appendix IV. Electives (art. 2.4)

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

In the following tables, the column on the right indicates the master's programmes for which the courses were developed in particular:

B = Biology
 EE = Ecology and Evolution
 MB = Marine Biology
 BiMoS = Biomolecular Sciences

Electives organised by the research institutes GELIFES and ESRIG:

Course	ECTS	Programmes
Advanced selforganisation of social systems	5	B, EE, MB
Advanced imaging techniques	5	B, BiMoS
Advanced Statistics	6	B, EE, MB, BiMoS
Animal and human experimentation: design, practice and ethics	5	B, EE, MB, BiMoS
Biological Modelling and Model Analysis	10	B, EE, MB, BiMoS
Current themes seminar series	2	B, EE, MB
Mathematical models in ecology and evolution	6	B, EE, MB
Mathematics in the Life Sciences	5	B, EE, MB, BiMoS
Meta-analyses in Ecology (not in 2019-2020)	5	B, EE, MB
Molecular methods in ecology & evolution	5/10	B, EE, MB
Orientation on International Careers	5	B, EE, MB, BiMoS
Practical bioinformatics for biologists	5	B, EE, MB, BiMoS
Practical modelling for biologists	5	B, EE, MB
Programming in C++ for biologists	5/10	B, BN, EE, MB, BiMoS

Master courses/Electives organised by the research institute GBB:

Course	ECTS	Programmes
Advanced light microscopy	5	B, EE, MB, BiMoS
Advanced Membrane Biology	5	B, BiMoS
Advanced genetic engineering and complex gene regulatory circuitries	5	B, BiMoS
Advances in signal transduction	5	B, BiMoS
Advanced protein crystallography	5	B, BiMoS
Biocatalysis & Green chemistry	5	B, BiMoS
Electron microscopy of biological macromolecules	5	B, BiMoS
Molecular dynamics and modeling of membranes and proteins	5	B, BiMoS
Organelle and membrane biogenesis	5	B, BiMoS
Radioisotopes in experimental biology	5	B, EE, MB, BiMoS
Tools and approaches of systems biology	5	B, BiMoS
Transcriptomics: DNA microarrays and RNAseq	5	B, EE, MB, BiMoS

Electives organised by Biomedical Sciences/GELIFES:*

Course	ECTS	Programmes
Microbiological safety	1	B, BiMoS
Microbiome & Health	5	B, EE, MB, BiMoS
Molecular biology of ageing and age-related diseases	5	B, BiMoS
Neurobiology of nutrition	5	B
Neurodegenerative diseases	5	B
Nutrition, Brain Development and Cognition	5	B
Scientific writing	5	B, EE, MB, BiMoS

*Students BMS have priority in enrolment

Electives organised by Science & Society:

Course	ECTS	Programmes
Science & Business	10	B, EE, MB, BiMoS
Science & Policy	10	B, EE, MB, BiMoS

Electives organised by Energy and Environmental sciences*:

Course	ECTS	Programmes
Impacts of Energy and Material Systems	5	B, EE, BiMoS
Sustainable Use of Ecosystems	5	B, EE, BiMoS
Sustainability & Society	5	B, EE, BiMoS
Systems Integration and Sustainability	5	B, EE, BiMoS

* Students EES have priority in enrolment

Electives organised by Education and Communication*:

Course	ECTS	Programmes
History and Philosophy of Science	5	B, EE, MB, BiMoS
Research Methods in Science Education and Communication	5	B, EE, MB, BiMoS
Nature of Scientific Disciplines	5	B, EE, MB, BiMoS
<u>Design for Science Education and Communication</u>	10	B, EE, MB, BiMoS
<u>Skills in Science Communication</u>	5	B, EE, MB, BiMoS
Science and the Public	5	B, EE, MB, BiMoS
Science Communication and Journalism	5	B, EE, MB, BiMoS

*Students EC have priority in enrolment

Electives organised by The Donald Smits Center for Information Technology:

Course (max 2 ECTS per individual programme[^])	½ day unit[^]	Programmes
Access basic	5	B, EE, MB, BiMoS
Excel basic	3	B, EE, MB, BiMoS
Excel advanced	5	B, EE, MB, BiMoS

[^] 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 (low student rate), 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.

Electives organised by Chemistry:

Course	ECTS	Programmes
Advances in Chemical Biology	5	B, BiMoS
Modern Laser Microscopy	5	B, BiMoS
Synthetic Biology & Systems Chemistry	5	B, BiMoS

Elective organised by the centre for Synthetic Biology:

Course	ECTS	Programmes
iGEM (International Genetically Engineered Machine competition)*	≤20	B, EE, MB, BiMoS

* Selection for this competition takes place in wintertime, an advertisement about application details will be announced via Nestor during the academic year.

Appendix V. Compulsory order of examinations (art 3.4)

Course unit	Entry requirement
Colloquium	Research project
Research project 2	Research project 1
<i>Biological Modelling & Model Analysis</i>	<i>Mathematics in the Life Sciences</i>

Appendix VI. Admission to the degree programmes 2019/2020

(art. 5.1 + art. 5.2)

1. Requirements for admission to the selective Master's degree in Biomolecular Sciences

Applicants have to fulfil the admission requirements:

- an academic Bachelor's degree with a specialization in Biochemistry, Molecular Biology, Biotechnology or Molecular Genetics;

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, or the combination of the major Biomedische wetenschappen or the major Gedrag en Neurowetenschappen or the major Medisch farmaceutische wetenschappen in combination with the minor Moleculaire Levenswetenschappen, have sufficient knowledge and skills and can be admitted to the Master's degree programme in Biomolecular Sciences on that basis

Holders of a Bachelor's degree in Chemistry with the major Chemistry of Life can be admitted to this master's programme

- sufficient English proficiency;

Score -> Test	Overall	Reading	Listening	Speaking	Writing
IELTS (Academic)	6.5	6.5	6.5	6.5	6.5
TOEFL IBT (internet-based)	90	21	21	21	24
Cambridge English	CAE or CPE Certificate with a minimum score of 180				
English language test – TC UG	n/a	B2	B2	B2	C1

This requirement is also fulfilled in case the applicant:

- is a native speaker and completed secondary education in any one of the following countries: Australia, Canada, Ireland, New Zealand, UK or USA;
- has completed a full time bachelor's degree programme (nominal duration of at least three years) in one of the following countries: Australia, Canada, Ireland, New Zealand, UK or USA;
- has an International Bacculaureate;
- has a European Bacculaureate diploma.

2. Applications procedure for selective master degree programmes: (art. 4.2)

All candidates have to register in Studielink and upload the following documents before 1 May (start 1 September):

- ID card or passport
- Diploma of relevant Bachelor's degree programme (if possible)
- List of grades (transcript of records)
- Proof of English language proficiency
- CV

- Motivation form:
- List of subjects/courses (to be) followed
- Brief description of 5 key subjects/courses
- A report as a result of an academic assignment in the context of the programme
- The report has to reflect the student's ability to produce a well-structured and concise report

After candidates have completed their registration in Studielink, applications will be processed in the following way:

For holders of a Dutch BSc diploma:

1. Education Support Centre compiles the individual selection file
2. Education Support Centre submits the individual selection file to the Admissions Board of the individual programme

For holders of a non-Dutch BSc diploma:

1. Admissions Office compiles the individual selection file
2. Admissions Office validates individual Bachelor's degree diploma
3. Admissions Office submits the individual selection file to the ESC
4. ESC submits the individual selection file to the Admission Board of the individual programme

3 Selection procedure

In order to select the best suited and motivated students, the Admission Board require a complete selection file from all candidates. The Admission Board of the individual programmes will review all individual applicants on the basis of their selection file. All candidates who meet the selection criteria 'academic performance' and 'motivation' (as specified by the different programmes) will be admitted. No maximum number of students applies.

At least two members of the Admissions Board score the selection criteria. Scoring is on a 9-point scale from 1 to 5 (1 = insufficient to 5 = excellent). If the scores on academic performance and/or motivation deviate 1 point or more, the members of the Admissions Board that gave the scores have to confer, after which they grade a second time. This outcome constitutes the final score. Candidates with minimally a sufficient average score of 3 for each criterion, and an average overall score of at least 3.5 are selected.

1. Academic performance (60%)

The score on academic performance is the result of the scores on relevance (70%) and proficiency (30%).

- **Relevance and affiliation/fit** of the followed bachelor programme to the master programme (list of subjects/courses followed and grades obtained; brief description of the content of 5 key subjects/courses demonstrating the knowledge and skill(s) acquired by the student).

Key subjects¹:

1. Genetics (Genetics, Molecular Genetics and Genomics*)
2. Biochemistry (Biochemistry, Bio-organic Chemistry, Biochemistry and Biophysics, Molecules and Reactivity*)
3. Microbiology (Microbiology, Thermodynamics, Kinetics & Enzymology*)
4. Cell Biology (Cell biology, Cell Physiology: Energy and Structure*)
5. Practical skills in Molecular Biology (Minimal Cell: Practical, Biomolecular research 1+2*)

¹ Key subjects/courses; the nature of the knowledge and relevant skill(s) are defined by the deputy director in consultation with the programme committee, and are approved by the director of the Graduate School.

* Please consult our online catalogue www.rug.nl/ocasys/ for the intended learning outcomes of the course units that cover these subjects

- **Proficiency** in completing an academic assignment in the context of the programme and in individually producing a written report on the assignment topic. The report has to reflect the student's ability to produce a well-structured and concise report. It also has to show that the student is developing a critical attitude and is capable of critical thinking. The assignment handed in is free of choice and can be a report on a practicum, experiment, field-work, a literature review, a bachelor thesis, etc.²)

² If the student has not made an individually written report during the bachelor programme he/she should contact the selection committee to receive an assignment on the basis of which a written report can be prepared.

2. Motivation (40%)

The candidate has to provide a motivation form (500 words) demonstrating a suitable stance and talent to follow the programme. The letter should address the following specific questions/issues:

1. Why did you choose this specific master's degree programme?
2. How did the Bachelor's degree programme, extracurricular activities, and/or other experiences prepare you for this specific master programme?
3. In case it took you longer than nominal to acquire the Bachelor's degree, please briefly explain the cause(s) of the delay
4. How will this master's degree programme prepare you for your future career and/or serves your ambitions?
5. Please shortly address specific topics in Biomolecular Sciences that particularly interest you
6. Free space to mention anything you feel is relevant and is not addressed by the questions above

Timeline for the application and selection procedure

The application procedure for the start on 1 September 2019 will open on 1 October 2018 and will close on 1 May 2019. In September 2018, the details of the entire application procedure will be published on the Admission and Application website for the individual Master's degree programme.

After registration in Studielink, all candidates will receive an email with an overview of the application procedure, the deadlines and instructions on how to proceed.

After candidates have successfully submitted all necessary documents, the Education Support Centre (for holders of a Dutch BSc diploma,) or the Admissions Office (for holders of a non-Dutch BSc diploma) will send the candidate a confirmation of receipt. Candidates will be offered placements between 1 October and 1 June (start 1 September).

Candidates who are not selected can lodge a written appeal against this decision within four weeks of the date of sending, with the Board of Appeal for Examinations, P.O. Box 72, 9700 AB Groningen, the Netherlands