

Appendices to the Teaching and Examination Regulations 2022-2023

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

The graduate:

1. a) 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;
- b) has acquired cross disciplinary knowledge of issues across scientific disciplines within the field of Biomolecular Sciences 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 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 | Course code | ECTS | entry requirements |
|--|--------------------|-------------|---------------------------|
| <i>Protein and Enzyme Engineering</i> | WMBS004-05 | 5 | |
| 3 compulsory master courses [#] | | 15 | see Ocasys |
| Research project (RP)* | WMBS901-xx | 40 or ≥ | see appendix V |
| Research project (RP)* | WMBS902-xx | 30 or ≥ | see appendix V |
| Colloquium | WMBS015-05 | 5 | RP |
| Essay | WMBS016-05 | 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 mentors 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) or the University Medical Centre Groningen under supervision of one of the examiners of the degree 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 either 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
- [#]Students have to pass three courses out of the following courses:
 1. Advances in Signal Transduction; 5 ECTS; WMBS009-05
 2. Advanced Membrane Biology; 5 ECTS; WMBS007-05
 3. Organelle and Membrane Biogenesis; 5 ECTS; WMBS012-05
 4. Molecular Dynamics and Modelling of Membranes and Proteins; 5 ECTS; WMBS003-05
 5. Electron microscopy of biological macromolecules: 5 ECTS; WMBS011-05

6. Advanced Protein Crystallography; 5 ECTS; WMBS008-05
7. Tools and Approaches of Systems Biology; 5 ECTS; WMBS005-05
8. Transcriptomics: DNA Microarrays and RNAseq; 5 ECTS; WMBS014-05
9. Advanced Genetic Engineering and Complex Gene Regulatory Circuitries; 5 ECTS; WMBS006-05

Additional requirements for the specialization *Chemical biology*

Students have to pass the following courses:

1. Advanced Protein Crystallography; 5 ECTS; WMBS008-05
2. Advances in Chemical Biology; 5 ECTS; WMCH014-05
3. Synthetic Biology & Systems Chemistry; 5 ECTS; WMCH021-05

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 programmes, or other universities in the Netherlands or abroad.

Master courses/Electives organised by the research institute GBB:

| Course | | 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 | | 5 |
| Electron Microscopy of Biological Macromolecules | WMBS011-05 | 5 |
| Molecular Dynamics and Modeling 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 |

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

Electives 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 |
| Mathematical Models in Ecology and Evolution | WMEV013-06 | 6 |
| Mathematics in the Life Sciences | WMBY006-05 | 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 |

* 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.

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 |
|------------------------|------------|---|

*Students MSc Biomedical Sciences have priority in enrolment

Electives organised by Science & Society:

| Course | Course code | ECTS |
|------------------------------------|-------------|------|
| Introduction to Science & Business | WMSE001-10 | 10 |
| Introduction to Science & Policy | WMSE002-10 | 10 |

Electives 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 in enrolment

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 | TEM0205 | 5 |

** Dutch-speaking students only

Electives organised by Chemistry:

| Course | Course code | ECTS |
|---|-------------|------|
| Advances in Chemical Biology | WMCH014-05 | 5 |
| Biophysical Imaging & Manipulation Techniques | WMPH047-05 | 5 |
| Synthetic Biology & Systems Chemistry | WMCH021-05 | 5 |

Electives 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 1 |
| Biological Modelling & 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 selective Master's degree in Biomolecular Sciences

Holders of the following Bachelor's degrees are considered to have sufficient knowledge and skills to be admitted to the Master's degree programme in Biomolecular Sciences on that basis:

- Holders of a Bachelor's degree in Biology from the University of Groningen, with the major Molecular Life Sciences;
- Holders of a Bachelor's degree in Life Science & Technology (old curriculum, prior to 2020/2021) from the University of Groningen, with the major Molecular Life Sciences, or the major Biomedical Sciences or the major Behaviour and Neurosciences with the minor Molecular Life Sciences.
- 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 Molecular Life Sciences (10EC) from Biology (Bachelor's Research Project in Chemical Biology/Molecular Biology with a Chemistry research group is also possible, but a Bachelor's Research Project via major Molecular Life Sciences is preferred) and a Bachelor's Thesis Life Sciences (5 EC) combined with the following courses:
 - Bioanalytical Omics Techniques
 - Practical Carousel
 - Cell Migration and Communication
- Holders of a Bachelor's degree in Pharmacy, from the University of Groningen, with the combination of the major Medical Pharmaceutical Sciences with the minor Molecular Life Sciences.
- Holders of a Bachelor's degree in Chemistry, from the University of Groningen, with the major Chemistry of Life.

For holders of another relevant academic Bachelor's degree with a specialization in Biochemistry, Molecular Biology, Biotechnology or Molecular Genetics 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>.

2. Applications procedure for selective Master degree programmes:

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
- Checklist:
 - Motivation
 - Reference contacts/letters
 - 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. The Student Administration FSE (SA FSE) compiles the individual selection file
2. The SA FSE 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 SA FSE
4. SA FSE submits the individual selection file to the Admission Board of the individual programme

3 Selection procedure

In order to select the appropriately suited and motivated students, the Admission Board requires 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 that have an appropriate background will be considered admissible and further considered for the selection procedure described below. All candidates who meet the selection criteria regarding 'academic performance' and 'motivation' (as specified by the different programmes) will be admitted to the programme.

At least two members of the Admission Board score the selection criteria. Scoring is on a 9-point scale from 1 to 5 (1 = insufficient to 5 = excellent with 0.5 steps). If the scores on academic performance and/or motivation deviate 1 point or more, the members of the Admission 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 average result of the scores on relevance (70%) and proficiency (30%). Maximum score 1 point per key subject for criterium on relevance and maximum 5 points for criterium on proficiency.

A) Relevance and affiliation/fit (70%) 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 programme specific knowledge and skill(s) acquired by the student).

Key subjects¹:

1. Genetics (Genetics Ecology & Evolution, Molecular Genetics, Bioinformatics)
2. Biochemistry (Molecules of Life, Basic Cell & Molecular Biology, Bio-organic Chemistry)
3. Microbiology (Microbiology, Host-Microbe Interactions, Enzymology & Thermodynamics)
4. Cell Biology (Basic Cell & Molecular Biology, Cell Biology & Immunology, Cell Biology & Microscopy)
5. Practical skills in Molecular Biology (Lab Course, Research Skills In Life Sciences 1+2+3, Bioinformatics, Practical Carrousel, Modelling Life)

¹ Key subjects/courses; the nature of the knowledge and relevant skill(s) are defined by the programme 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

B) Academic and analytical skills/Proficiency (30%) 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 in English during the Bachelor programme, he/she should contact the Student Administration FSE to receive an assignment on the basis of which a written report should be prepared.

2. Motivation (40%)

The candidate has to provide a motivation form (max. 500 words, part of the checklist) demonstrating a suitable stance and talent to follow the programme. Maximum score 1 point (1 point for excellent, 0,5 point for satisfying) per question/issue 1-5. In case a specific motivation is covered under question/issue 6, the BoA members will together discuss the scoring of this answer, and note this in the scoring sheet. 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 serve 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 the 1st of September will open on the 1st of October and will close on the 1st of May. The details of the entire application procedure are 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 Student Administration FSE (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 with minimally a sufficient average score of 3 for each criterion, and an average overall score of at least 3.5 are selected and will be offered a place in the programme.

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.

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