



**MSc Biomedical Sciences  
University of Amsterdam**

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Project code P2217

# Contents

- Summary ..... 4
  - Score table ..... 5
- Introduction..... 6
  - Procedure..... 6
  - Panel ..... 7
  - Information on the programme ..... 8
- Description of the assessment..... 9
  - Organisation ..... 9
  - Standard 1. Intended learning outcomes ..... 9
  - Standard 2. Teaching-learning environment..... 12
  - Standard 3. Student assessment ..... 18
  - Standard 4. Achieved learning outcomes ..... 22
  - General conclusion ..... 22
  - Development points ..... 21
- Appendix 1. Intended learning outcomes ..... 24
- Appendix 2. Programme curriculum..... 28
- Appendix 3. Programme of the site visit..... 29
- Appendix 4. Materials ..... 30

## Summary

### Standard 1. Intended learning outcomes

The panel appreciates the programme's clear profile. The 11 tracks are well-defined and clearly reflect the research orientations of the institutes involved. The major focus on an academic career combined with opportunities to select a broader profile has been well chosen in the panel's view. The programme corresponds with current international developments in the field and addresses issues of global interest. The panel is pleased with the wide range of opportunities that the programme offers which allow students to choose their own direction. The exit qualifications cover various cognitive levels, are appropriate in terms of level and orientation, and follow international standards as classified by the Dublin descriptors. They clearly demonstrate the programme's academic orientation as well as its attention to applying scientific knowledge to practical situations and societal issues. They are in line with the national exit qualifications of biomedical master's programmes and cater to the demands of the labour market. The panel also appreciates that the programme is well-embedded in internationally renowned academic institutes.

### Standard 2. Teaching-learning environment

The panel studied the curricula of the various tracks and concluded that the exit qualifications are adequately covered. The design of the overall curriculum is clear and well-structured. The panel also appreciates the level of freedom and flexibility in the programme. The content that is offered meets the standards of an academic master's degree.

The panel observed that the management of so many different tracks could be challenging. It encourages the management to continue paying sufficient time and attention to communication to maintain coherence in the programme and to ensure that written guidelines become more active. It also believes that the different tracks could benefit from knowledge of each other's best practices. Regarding the selection process, the panel advises the programme to evaluate whether the procedure is sufficiently transparent and to ensure that all prospective students receive adequate information on the aims and profile of the programme.

The panel compliments the programme for how it has implemented the previous panel's recommendations to provide more skills training to the students and to intensify its career development initiatives. It also believes that the programme's focus on internships and research projects is apt. Nonetheless, the panel noticed a gap between learning and applying in some instances and recommends paying attention to communicating with students about the internal cohesion within the programme. The panel believes the program is feasible, although it may be demanding to finish within the required two years. The panel experienced during its visit that the student adviser and track coordinators are greatly appreciated by the students and observed that the new position of track representatives has added considerable value to the social cohesion and satisfaction of the students.

The panel encourages the programme to evaluate whether more needs to be done to create a soft landing for international students and students from other Dutch universities. It also recommends improving guidance regarding obtaining internships particularly – but not only – for students from outside the UvA. The documents and interviews assured the panel that procedures around the final research projects are transparent and well-structured. The guidance and feedback provided during the projects are sound and appreciated by the students. The teaching staff is qualified and very committed to the students. With the recent hiring of extra academic staff, the programme appears to be adequately staffed.

### Standard 3. Student assessment

Based on this information and the meetings during the site visit, the panel concludes that assessment in all the tracks under review adequately covers the learning objectives and intended learning outcomes. The panel considers the methods of assessment to be varied and the quality of assessment in the master's programme to be adequate. It is generally valid, reliable, and transparent.

The panel read a representative sample of final reports and observed that, in general, it agreed on the final grades given by the reviewers. The panel noted with satisfaction that the process of assessing the final projects is well-designed, transparent, reliable, and valid. Notwithstanding the overall quality of the assessments, the panel noted that the quality and amount of feedback differed quite considerably. The panel, therefore, advises the development and enforcement of a guideline for assessors and examiners that ensures sufficient written feedback and substantiation of the grades for all students, also when their grade is equal to or lower than 8.

The panel observed with satisfaction that the Examinations Board feels well-assisted in terms of resources and support. Based on documentation and the interview with the Examinations Board, the panel concludes that the board adequately safeguards the quality of assessments and the level achieved within the programmes. The panel supports the continuing efforts of the board to strengthen itself and its position within the organization. It stresses the importance of the organization continuing to guard the independence of the committee and that other sections, such as the Board of Studies, continue to provide the Examinations Board with sufficient information.

### Standard 4. Achieved learning outcomes

In the panel's view, the final works studied by the panel show that the graduates achieve the intended learning outcomes. The projects are clearly of the level expected from a master's research project in the field of biomedical sciences and are often of high quality. They reflect the fact that many of the research projects are the result of internships at leading (inter)national institutes. Graduates are in a good position to commence an academic career as a PhD student or pursue a career outside academic research. The vast majority (94%) of the students found a position within a year or continued with another educational programme. The initiatives taken by the programme to better prepare students for employment since the last visitation seem to have been successful, resulting in more students indicating that the programme prepares them well for future employment.

### Score table

The panel assesses the M programme Biomedical Sciences as follows:

Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive
Prof. dr. Hans van Leeuwen Chair	Hester Minnema, LLM Secretary

Date: 14 February 2024

# Introduction

## Procedure

### Assessment

On 30 and 31 October 2023, the master's programme Biomedical Sciences of the University of Amsterdam (UvA) was assessed by an independent peer review panel as part of the cluster assessment Biomedical Sciences. The assessment cluster consisted of 18 programmes, offered by Wageningen University and Research, Vrije Universiteit Amsterdam, University of Amsterdam, Leiden University, Radboud University, Maastricht University and Utrecht University. The assessment followed the procedure and standards of the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands (September 2018).

Quality assurance agency Academion coordinated the assessment upon request of the cluster Biomedical Sciences. Peter Hilderling and Jessica van Rossum acted as coordinator and Annemarie Venemans, Hester Minnema, Carlijn Braam and Jessica van Rossum acted as secretaries in the cluster assessment. They have been certified and registered by the NVAO.

### Preparation

Academion composed the peer review panel in cooperation with the institutions and taking into account the expertise and independence of the members as well as consistency within the cluster. On 25 July 2023, the NVAO approved the composition of the panel. The coordinator instructed the panel chair on his role in the site visit according to the Panel chair profile (NVAO 2016).

The programme composed a site visit schedule in consultation with the coordinator (see appendix 3). The programme selected representative partners for the various interviews. It also determined that the development dialogue would be made part of the site visit. A separate development report was made based on this dialogue.

The programme provided the coordinator with a list of graduates over the periods 2018 - 2019 and 2021 - 2022. In consultation with the coordinator, the panel chair selected 15 theses. They took the diversity of final grades and examiners into account, as well as the various tracks. Prior to the site visit, the programme provided the panel with the theses and the accompanying assessment forms. They also provided the panel with the self-evaluation report(s) and additional materials (see appendix 4).

The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation reports and the theses, as well as the division of tasks during the site visit. The panel was also informed on the assessment framework, the working method and the planning of the site visits and reports.

### Site visit

During the site visit, the panel interviewed various programme representatives (see appendix 3). The panel also offered students and staff members an opportunity for confidential discussion during a consultation hour. No consultation was requested. The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the preliminary findings.

## Report

The secretary wrote a draft report based on the panel's findings and submitted it to the coordinator for peer assessment. Subsequently, the secretary sent the report to the panel for feedback. After processing this feedback, the coordinator sent the draft report to the programme in order to have it checked for factual irregularities. The secretary discussed the ensuing comments with the panel chair and changes were implemented accordingly. The panel then finalised the report, and the coordinator sent it to the University of Amsterdam.

## Panel

The following panel members were involved in the cluster assessment:

- Prof. dr. Hans van Leeuwen, professor of Calcium and Bone Metabolism, Erasmus MC – chair;
- Dr. Annik van Keer, Education Policy Adviser, Utrecht University;
- Dr. Mieke Latijnhouwers, Assessment Expert, Wageningen University & Research;
- Prof. dr. Frans Ramaekers, emeritus professor Molecular Cell Biology at Maastricht UMC and CSO and QA Manager at Nordic-MUBio;
- Prof. dr. Jan Eggermont, biomedical researcher in Cell Physiology, KU Leuven;
- Dr. Geert Ramakers, associate professor Translational Neuroscience, UMC Utrecht;
- Dr. Leo Schouten, associate professor Cancer Epidemiology, Maastricht University;
- Prof. Marjukka Kolehmainen, professor of Food and Health, University of Eastern Finland;
- Liliane Bouma-Ploumen MSc, Policy Adviser [secondary education], Bètapartners;
- Dr. Maud Huynen, assistant professor Planetary Health, Maastricht University;
- Dr. Margot Kok, Education Policy Department Manager, Utrecht University;
- Prof. dr. Dennis Claessen, professor of Molecular Microbiology, Leiden University;
- Emma van Wijk BSc, master student Biomedical Sciences, Radboud University – student member;
- Daphne Louws BSc, master student Nutrition and Health, Wageningen University & Research – student member;
- Prof. dr. Mieke Verstuyf, professor of Clinical and Experimental Endocrinology, KU Leuven – referee;
- Dr. Jur Koksma, assistant professor Transformative Learning, Radboud University – referee;
- Prof. dr. Ton Bisseling, emeritus professor of Molecular Biology, Wageningen University & Research – referee.

The panel assessing the master's programme Biomedical Sciences at the University of Amsterdam consisted of the following members:

- Prof. dr. Hans van Leeuwen, professor of Calcium and Bone Metabolism, Erasmus MC – chair;
- Dr. Mieke Latijnhouwers, Assessment Expert, Wageningen University & Research;
- Prof. dr. Frans Ramaekers, emeritus professor Molecular Cell Biology at Maastricht UMC and CSO and QA Manager at Nordic-MUBio;
- Dr. Geert Ramakers, associate professor Translational Neuroscience, UMC Utrecht;
- Daphne Louws BSc, master student Nutrition and Health, Wageningen University & Research – student member;
- Dr. Jur Koksma, assistant professor Transformative Learning, Radboud University – referee.

## Information on the programme

Name of the institution:	University of Amsterdam (UvA)
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	M Biomedical Sciences
CROHO number:	66990
Level:	Master
Orientation:	Academic
Number of credits:	120 EC
Specialisations or tracks:	<ul style="list-style-type: none"><li>- Cardiovascular Sciences (CVS)</li><li>- Cell Biology and Advanced Microscopy (CBAM)</li><li>- Developmental and Therapeutic Biology (DTB)</li><li>- Experimental Internal Medicine (EIM)</li><li>- Infection and Immunity (I&amp;I)</li><li>- Oncology (ONC)</li><li>- Medical Biochemistry and Biotechnology (MBB)</li><li>- Cognitive Neurobiology and Clinical Neurophysiology (CN2)</li><li>- Molecular Neurosciences (MNS)</li><li>- Physiology of Synapses and Networks (PSN)</li><li>- Psychopharmacology and Psychopathology (PPP)</li><li>- Major Science Communication (offered by Vrije Universiteit)</li><li>- Major Science in Society (offered by Vrije Universiteit)</li><li>- Major Teaching</li></ul>
Location:	Amsterdam
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	May 1, 2024



## Description of the assessment

### Organization

The Biomedical Sciences master's programme is organized by the Faculty of Natural Science, Mathematics & Computer Science (FNWI) at the University of Amsterdam (UvA) in close collaboration with the FNWI Swammerdam Institute of Life Sciences (SILS), the Amsterdam University Medical Center (AUMC), the Netherlands Cancer Institute (NKI), and Sanquin (Blood Supply Foundation). It is a two-year programme taught in English for which the Graduate School of Life and Earth Sciences (GSLES) at FNWI is responsible. The number of students enrolling in the programme has gradually increased and totalled approximately 175 in the academic year 2021/2022.

### Recommendations of the previous review

In the critical reflections concerning the information file provided, the programme made several references to the recommendations of the previous accreditation panel (2017). The current panel discussed several of these recommendations and their follow-up actions with the programme during the site visit. The panel concluded that on the whole the recommendations have been seriously addressed by the programme, and the panel is generally satisfied with the improvement actions that have been undertaken. Where relevant this report will elaborate on these recommendations under the individual standards.

### Standard 1. Intended learning outcomes

The intended learning outcomes are linked with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

### Findings

The Biomedical Sciences master's programme focuses on the molecular and cellular basis of biomedical science. It aims to equip students with deep knowledge and skills to independently perform scientific research, using tools ranging from molecular biology, biochemistry, and physiology to computation and modelling. The graduates learn to write reports and communicate their research to others, give scientific presentations, develop hypotheses, write grant proposals, and think critically. They are also able to analyse and synthesize existing knowledge and formulate new hypotheses and concepts.

The programme is heavily research-oriented and multidisciplinary, which the panel considers appropriate given the nature of the field. The major focus of the programme is to prepare students for an academic career, but it also provides options for those desiring a broader profile by offering four 60 EC majors, a 30 EC so-called *TESLA minor*,<sup>1</sup> and ample opportunities to choose electives.

The programme has 11 specialization tracks that strongly reflect the research carried out at the participating academic institutes. The tracks are divided into two clusters: Medical Biology and Neurobiology. The Medical Biology cluster contains seven tracks: *Medical Biochemistry and Biotechnology*, *Cell Biology and Advanced Microscopy*, *Infection and Immunity*, *Oncology*, *Experimental Internal Medicine*, *Developmental and*

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<sup>1</sup> The TESLA minor for students from science faculties is part of the master's programme Biological Sciences and accredited under that programme. It provides teaching and learning around a real business case in a multidisciplinary team. For an in-depth discussion of this minor, the panel refers to the report of the accreditation panel of the MSc Biological Sciences at the UvA (2021).

*Therapeutic Biology* (since 2019/2020), and *Cardiovascular Sciences* (since 2022/2023). Tracks in this cluster are designed for students who want to gain fundamental in-depth knowledge of the biochemical and molecular biological background of pathophysiological processes. The Neurobiology cluster contains four tracks: *Molecular Neurosciences*, *Psychopharmacology and Pathophysiology*, *Physiology of Synapses and Networks*, and *Cognitive Neurobiology and Clinical Neurophysiology*. This cluster caters to students who are particularly interested in the functioning of the human brain.

The panel is pleased with the wide range of opportunities that the programme offers students to choose their own directions. In the first year, students start with the mandatory track specific courses (18EC). Students who have obtained at least 12 EC of the track specific courses can start with a research project or choose an elective course prior to their research project. In the second year, students continue their research project and the literature review and can choose additional elective courses. After the first year, students are offered the opportunity to broaden their knowledge and skills by choosing one of the following options:

1. One of the four major programmes (60 EC each):
  - i) The major *Science Communication* prepares students for a role in communication between the science sector and other societal sectors (offered by Vrije Universiteit)
  - ii) The major *Science in Society* trains students in skills such as reading and writing policy advisory reports, management, leadership, and organization. This major is meant for students with a broad interest in current affairs, social issues, policy, management, and entrepreneurship (offered by Vrije Universiteit).
  - iii) The major *Teaching* provides students with a teaching qualification in biology in secondary education and in (higher) vocational education. This major was evaluated as part of the UvA teacher education MSc programmes in 2020–2021.
  - iv) The major *Big Biomedical Data Analysis* begins with three courses of six EC each: Genomics, Transcriptomics, and Proteomics/Metabolomics. After the three courses, the students perform a dry lab internship. During these 42 EC internships, the students show that they can use bioinformatics and omics data to conduct biomedical/biological research.

For students who do not wish to pursue careers as researchers, the first three majors offer adequate preparation for jobs in other organizations, such as business, teaching institutions, or media and communication positions. The panel evaluated the first two majors during the site visit to the MSc in Biomedical Sciences at the VU within the same cluster. This report only discusses the alignment of these majors with the UvA programme; for the content we refer to the VU report.

2. The minor *TESLA* (30 EC) trains students in complex consultancy projects that combine science with a business or with societal challenges (cf. Standard 2).

The panel appreciates that the programme broadens the perspective of its students by making these relevant majors and minor part of the programme. The panel also noted with satisfaction that the programme acted on the recommendation of the previous panel to increase the presence of (big) data science and bioinformatics in the programme.

Since 2017, students have also been able to choose to follow the double master's degree programme in biomedical sciences and medicine (three years). Approximately 15 students per year enrol in this programme. It is only accessible for students who meet the entry requirements for both the Medicine and Biomedical Sciences masters' programmes.

A strong asset of the programme, according to the panel, is the way in which it is embedded in internationally renowned academic institutes. Long-term internships in these research environments – which are often prospective employers – form the core of the programme and reflect the philosophy that participating in practice is the best way to prepare students to become good professionals. The programme is consistent with current international developments in the field and addresses issues of global interest.

#### *Intended learning outcomes*

The panel concluded from the documentation that the profile of the programme has been translated into one set of clear exit qualifications that apply to all 11 tracks and some additional qualifications separately formulated for each track. The tracks are well-defined and reflect the research orientation of the institutes involved. The majors and the minor have some additional qualifications listed in the Teaching and Examination Regulation (TER).

The exit qualifications cover various cognitive levels and follow international standards as classified by the Dublin descriptors. They are also consistent with the national exit qualifications of biomedical master's degree programmes and cater to the demands of the labour market. The panel is positive about the recently established *Professional Advisory Board* ('*Werkveldadviesraad*'), which consists of professionals working in a wide range of relevant fields. The board advises on the content of the programme and suggests adjustments to keep the programme up to date with recent developments.

The panel's assessment is that the exit qualifications of the tracks clearly demonstrate the programme's academic orientation as well as its attention to the application of scientific knowledge to practical situations and societal issues. The exit qualifications are appropriate for a master's programme in terms of level and orientation.

#### Considerations

The panel appreciates the programme's clear profile. The 11 tracks are well-defined and clearly reflect the research orientations of the institutes involved. The major focus on an academic career combined with opportunities to select a broader profile has been well chosen in the panel's view. The programme corresponds with current international developments in the field and addresses issues of global interest. The panel is pleased with the wide range of opportunities that the programme offers which allow students to choose their own direction. The exit qualifications cover various cognitive levels, are appropriate in terms of level and orientation, and follow international standards as classified by the Dublin descriptors. They clearly demonstrate the programme's academic orientation as well as its attention to applying scientific knowledge to practical situations and societal issues. They are in line with the national exit qualifications of biomedical master's programmes and cater to the demands of the labour market. The panel also appreciates that the programme is well-embedded in internationally renowned academic institutes.

#### Conclusion

The panel concludes that the programme meets standard 1.

## Standard 2. Teaching-learning environment

The curriculum, the teaching-learning environment, and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

### Findings

#### *Curriculum*

The Biomedical Sciences master's programme is a two-year programme that develops from lecturer-directed learning, to student-centred and more self-directed learning, to the master-apprentice model in the literature review and research projects.

The 11 tracks of the programme all have an identical structure, but differ in terms of the compulsory course content, the elective courses offered, and the content of literature review and research projects. The professional elective skills courses in year 1 and 2 are open to students from all tracks.

The 120 EC programme contains three basic components: courses, a literature review, and two research projects. Students who choose to follow a major programme conduct only one research project. Each track commences in the first semester with its own compulsory courses, which comprise a total study load of 18 EC. The seven tracks of the Medical Biology cluster each begin with the six EC course *Molecular Biology of the Cell*. In the neurobiological cluster, all the tracks have separate courses. The students to whom the panel spoke greatly appreciated this communal start since it gave them time to grasp the structure of the programme and the field and to get to know one another. During the mandatory *Literature Review* (12 EC), the student is challenged to write an in-depth literature overview on a contemporary topic within the scope of the track in which the student is participating. Students are given the freedom to choose topics of interest after consultation with their track coordinator.

Both research projects (1 and 2) form the largest part of the programme. During an internship, the students conduct a research project in which they gain hands-on practical experience by designing and performing a scientific research project in a laboratory under the supervision of scientific staff. Unless they choose a major, students carry out two research projects, worth a minimum of 30 EC and a maximum of 60 EC each. Students can participate in up to 18 EC elective courses, such as the *Laboratory Animal Course [art.9]*, which grants the students an official licence to work with small animals (such as mice and rats) in a laboratory setting upon successful completion. Students can also choose electives from other tracks in the programme or an approved course list. Students who have completed the first research project and the literature review before the beginning of the third semester may choose to follow one of the four majors. In that case, they continue their studies in their second year with the curriculum of the chosen major (courses and a research project). Students who manage to finish their second *research project* and *literature review* before the fourth semester may apply for the *TESLA minor* for 30 EC (cf. Standard 1). This minor is part of the Biological Sciences master's programme at the UvA.

Within the confines of this structure, students have considerable freedom to design their own study trajectories, which the panel applauds. The panel sees the large number of tracks as a strength in terms of small groups, personal approach, and room for students to choose, but also observed that managing so many different tracks can be challenging. The panel noticed that the programme provides for a large set of documents and detailed educational policy, but also found some discrepancies between paper and practice at various levels. In their SWOT analysis, the students also pointed to the differences between the tracks, both in terms of teaching methods and assessments. In addition, the panel noticed in some instances a gap

between learning concepts and theory and application of these. For students, it did not always seem clear why they learned something at one particular moment in the curriculum without a direct link to practice. The panel recommends paying attention to the communication with students regarding the internal cohesion within the programme and encourages the management to continue giving sufficient time and attention to the communication between tracks and the communication to all teaching staff members. This should help maintain coherence in the programme and ensure that the written guidelines become more active.

In the cohorts graduating in 2020 and 2021, 15% and 16%, respectively, followed a major. The last accreditation panel suggested in 2017 that the limited number of students who choose one of these majors could be due to the fact that the profiles of these different trajectories, leading to different areas of employment, are not sufficiently clear to the students. The present panel acknowledges a small increase in the enrolments in the majors from 13.6% to 16% and encourages the programme to continue paying attention to the communication to students about the options to broaden the scope of their programme. Also teaching staff should be aware of these majors.

The panel studied the curricula of the various tracks and concluded that the exit qualifications are adequately covered. The design of the overall curriculum is clear and well-structured. Students can use what they have learned during the courses directly in the literary review and their research projects; the introductory courses are also beneficial for social cohesion among students. The students also appreciate the level of freedom and flexibility in the programme. The content of the courses that the panel studied meet the standards of an academic master's degree.

The panel learned during its meetings that animal welfare in relation to experiments with animals is embedded in several general courses as well as in the *Laboratory Animal Course*. The *Laboratory Animal Course* is mandatory for those who want to obtain a certificate under Article 9 of the *Experiment on Animals Act*. In this course, students are also learning about alternatives to animal experiments, which the panel applauds. However, it does feel that existence and development of alternatives to animal experiments, such as Human Organoids, organs on a chip, and induced pluripotent stem cells, could be more visible in the programme and that all students should learn about them, rather than only the students who follow the *Laboratory Animal Course*.

#### *Enrolment and selection*

The enrolments into the programme have gradually increased over recent years to approximately 175 students in 2021/2022. Most of the enrolling students have graduated from one of the UvA bachelor's degree programmes (mostly BMS and Psychobiology). The number of international students has increased the most, which is likely to be due to the programme's efforts in this respect based on recommendations from the previous visitation panel.

The master's programme is open to students with a bachelor's degree in biomedical sciences, psychobiology, or an equivalent degree from a Dutch university. All students must have advanced knowledge relevant to the cluster to which they seek admittance, have a bachelor's degree grade point average of 6.5 or higher, have obtained their bachelor's degree with a maximum delay of one year, and have completed experimental work relevant to the track worth at least 15 EC. Students with a vocational bachelor's degree are also admissible but may be additionally evaluated for background knowledge, motivation, and cognitive skills. International students need to provide evidence of a proper command of the English language in addition to a formal appreciation of their diplomas and practical experience.

A maximum of 240 students can be admitted to the master's programme, and all tracks have a limited capacity of between 20 and 25 students each. If more than the maximum number of candidates are found to be admissible, candidates will be selected based on their previous study programme, their GPA score, their study progress in the bachelor's programme, the subject of their bachelor's thesis, and their motivation. In cases when a student is not selected for their preferred track, the programme tries to accommodate the student by offering a seat in the track of their second choice or another track. The panel discussed the selection procedure with the students and learned that the procedure was transparent and adequate for most of them. However, for those who did not follow the UvA bachelor programme, not all the requirement information was known, clear, or timely enough. For instance, in some tracks the content of previous internships is crucial, but there are doubts about whether all students recognize that well in advance. Students also mentioned that some tracks position themselves in practice as a research master's, solely aiming towards a PhD trajectory, which was not clear to them prior to applying. Consequently, the panel advises the programme to evaluate whether the procedure is transparent enough – especially for those who do not come from the UvA bachelor's degree programme – and to ensure that all prospective students receive adequate information on the aims and profile of the programme and the individual tracks.

### *Skills*

The panel that visited the programme in 2017 recommended providing more general skills training for the students. The panel applauds the programme for the way in which it has implemented this recommendation. The programme has developed some new elective skills courses: *Microscopy and Flow Data Analysis* (6 EC), *From Interdisciplinary Science to Business* (9 EC), and *Critically Reading Scientific Papers* (6 EC) and developed a new cycle of *Professional Skills Courses* (2x 1.5 EC mandatory in each track). The *Professional Skills Courses* focus on general (i.e., not study programme-specific) transferable professional skills that students need for careers inside and outside the academic world, while simultaneously incorporating the context of the scientific knowledge that students bring from their own disciplines. Students can choose one or more of the 13 available courses.

### *Methods of instruction*

The mandatory courses at the beginning of the programme are highly valued by the students. They told the panel that the first semester is very intense and demanding, but extremely valuable. For some of them, the courses were a great accelerator right at the beginning of the programme.

A large part of the programme is filled with internships/research projects. Students greatly appreciate this structure. In most cases, students undertake their first internship near home (AUMC or FNWI). For the second internship, the students choose a placement at one of the other affiliated institutes (NKI, SILS or Sanquin) or abroad (approximately 30% to 40%). The number of students going abroad differs per track: in some – such as the Cardiovascular Sciences track – more than 60% of the students choose this option. The panel thinks that the programme's strong focus on the internships/research projects is apposite, and it is very positive about the many opportunities that exist to find internships abroad.

In its Critical Reflection, the programme mentions its concern regarding the small number of internships in a commercial setting. In discussions with the panel, faculty have indicated that they have been hindered in increasing the number of internships by a lack of legal advice from the university regarding drafting or modifying non-disclosure agreements. The panel believes it would be advisable for the university or faculty to pay more attention to this request to expedite these processes.

It appears to the panel that the preparation for the internships is quite different for each track. Some alumni to whom the panel spoke were very happy with the fact that in their tracks they had already experienced a

number of practicals before commencing their internships. This way they experienced different methods of lab-research, which helped them both in choosing their internship and during the internship itself. However, alumni from other tracks indicated that their tracks contained few practicals, but that they would have benefitted from them. The panel recommends exploring whether this example and other best practices can be used by all tracks.

#### *Career development*

The previous panel recommended that the programme intensify its career development initiatives. The panel is pleased to see that the programme took this recommendation seriously and began – under the title of *Academic Development* – a series of lectures followed by a social programme. This academic development cycle covers popular science writing, intellectual property protection/business development, and scientific integrity in a workshop format that lasts an hour. The final part of the academic development cycle consists of the career event, in which students can present their projects to their peers and learn about several aspects of careers after graduation. The organization of this event is partially driven by students, thus, allowing them to experience the organization of an event and expand their networks. Some alumni mentioned that there is no strong alumni network, which the panel views as an opportunity to further develop. The panel encourages the programme to continue the fruitful combination of creating social cohesion and offering information on career-related issues. It also stresses that strengthening the alumni network can be very helpful in this respect.

#### *Feasibility*

The panel discussed the feasibility of the programme with the management, students, and teachers. Over the past years (2010-2020) there is a decreasing trend towards 25% of the students that finish their master programme within the prescribed two years. Students indicated that the programme can be completed in two years, but that it is quite demanding to do so. They stated it may not be the work per se but rather the organizational side of the programme, such as finding research topics and a supervisor for the literature review, and internships. Nonetheless, the flip side of the freedom within the programme seems to be that students develop strong organizational skills and a clear sense of their preferred direction at an early stage. Some had problems finding a suitable internship, which caused a delay. Students told the panel that they do receive help with planning and finding internships, but a lack of information can create obstacles, particularly for students entering the programme from abroad or other universities. The fact that some students do finish the programme within the required timespan can be seen as proof that the two-year completion is feasible and that the delay may be explained by the individual choices of students. Nevertheless, the panel recommends improving guidance on obtaining internships particularly – but not only – for bachelor graduates from outside the UvA.

#### *Student guidance*

Each track has one or two track coordinators who are the primary contact persons for the students. The small scale of the tracks ensures that a personal bond between track coordinators and students is possible. The track coordinators are active researchers and have ample experience in academic teaching and supervision of students and researchers. For more complex issues, they can refer students to the programme directors, programme manager, the International Office, or study adviser. The study adviser is the primary contact person for students with personal problems. Even though these officers are highly valued by the students, previous students were not always satisfied with how the programme communicated with them. Consequently, the panel was pleased to learn in the meeting with students and by reading the student chapter that the recent appointment of track representatives has resulted in a substantial improvement in the communication. The representatives are second-year students who can be approached with various questions by first-year students of their own track. The representatives report to the track coordinator and

the study adviser every two months, and they can facilitate the programme management and study adviser to contact students. During its visit, the panel concluded that this new position has added great value to the cohesion and satisfaction of the students.

Students are required to complete an online study plan in the Study Plan Application (SPA), describing their individual master's programme. The track coordinators help and advise the student with composing the study plan. At the beginning of the master's degree, the SPA may contain a broad outline of the study plan, which can be updated several times. The programme considers this rewriting of the SPA to be an important part of the programme because it provides an incentive for students to seek counselling and advice from their track coordinator about study and career choices. The panel endorses this approach.

The integration of international students and other students who are new at the UvA is a point of attention for the programme, as stated in the Critical Reflection. To create a 'soft landing' for these students, the programme organizes an introductory meeting to inform them about day-to-day practicalities but also aspects of Dutch culture and manners. There are also online Q and A sessions for future and current students. However, the students to whom the panel spoke thought these sessions were too short and not sufficiently informative in comparison to the full week that was offered during the bachelor's degree programme on tools and orientation. The panel believes the programme made well-considered choices for these activities, but also encourages the programme to seriously consider the comments of the students and evaluate whether more information is needed.

#### *Supervision of the research project*

The procedure for the research project is clearly formulated in the Protocol (course manual) Research Project Master's Programme Biomedical Sciences (November 2022) and the Assessment Plan Master's Programme Biomedical Sciences (July 2023).

The research project trajectory starts with the project proposal the student writes in consultation with both the intended daily supervisor and assessor. Upon approval of the proposal by the track coordinator, the student can commence the research as planned. Four to 10 weeks after the start date, a (formative) interim assessment takes place with the student, the daily supervisor, and the assessor. After finalizing the final report, the student gives an oral presentation of the project, which is graded (cf. Standard 3). Supervision of the final projects of students who follow one of the majors outside the faculty are subject to the protocols of the respective programme or institution.

As stated in the protocol, the daily supervisor is a PhD student, postdoctoral fellow, or permanent staff member at the faculty, research institute, or company where the research project is performed. During the research project, the student can depend on the daily supervisor for feedback and daily support on all aspects of the research project during formal and informal meetings. The assessor is a permanent staff member with a doctoral degree at the faculty, research institute, or company where the student carries out the research project. The assessor is responsible for the supervision of the student's research project and often leads the research group in which the student's research project is embedded. The assessor is regularly available (usually a couple of hours per week) at all stages of the research project to provide support and feedback to the student. The assessor carries out the interim assessment (formative) and suggests – in consultation with the daily supervisor – a final grade to the examiner, who is the person responsible for determining the grade.



The examiner is appointed by the Examinations Board of the master's programme at the Faculty of Science (FNWI). This examiner assesses the final report and determines and submits the final grade. The assessor and the examiner must be two different persons, but an assessor can act as a daily supervisor.

During the site visit, the panel learned to their satisfaction that the students were happy with the guidance and feedback of their supervisors. The students stated the feedback is helpful and often detailed. More generally, the documents and interviews assured the panel that procedures around the final projects are transparent and well-structured (for more on the assessment of research projects, cf. Standard 3).

#### *Student feedback*

Students are asked to give their feedback on courses by filling out a questionnaire in UvAQ. The Board of Studies ('Opleidingscommissie' or 'OC') also fulfils a role in assuring the quality of the organizational, didactical, and assessment aspects of all courses. Each course is annually evaluated by the attending students; the course coordinators are asked to comment on these evaluations, and these results are subsequently discussed by the Board of Studies. The exit evaluations provide an opportunity for the OC to assess the quality of the research projects in general. If improvements are deemed necessary, the OC advises the programme director of improvements they think are needed. However, the feedback rate of students has been very low and declined still further after the implementation of online questionnaires. Therefore, the programme returned to hard copy evaluations directly after the exam to improve the response rate. The OC also initiated panel discussions per track. The panel is very positive about the OC's efforts to increase the feedback rate and encourages the programme, in general, to utilize as many channels as possible to inspire feedback from students and to communicate back to students what has been done with their feedback.

#### *Language of instruction*

During the site visit, the panel discussed the use of English as the language of instruction and the programme name with the programme management. The panel considers English an appropriate choice given the international orientation of the research field and the global labour market. English language proficiency (level C1) is one of the recruitment requirements for academic staff. Students appreciate that the programme is taught in English. Foreign students entering the programme (currently comprising between 20% and 25% of the student population) must meet English language proficiency requirements as a condition of admission.

#### *Teaching staff and facilities*

The panel met with qualified and passionate teaching staff. It assessed that the teaching staff have the qualifications needed to deliver the programme. Almost all teaching staff are actively involved in the research institutes and range from full-time basic researchers to medical doctors with clinical research interests. They encompass the expertise needed to offer the various tracks. Most staff members have a doctoral degree and are also didactically skilled. At the time of the visitation, nearly 80% of the teaching staff hold a Basic Teaching Qualification ('Basiskwalificatie Onderwijs' or 'BKO').

Senior researchers and professors are actively participating in the courses and supervision of graduation trajectories. Notwithstanding the high workload, the teachers do not seem overburdened. In fact, they told the panel how motivating it can be when the courses they teach address the same subjects as their research. Some told the panel that the National Recognition and Rewards Programme also offered better career prospects for those with large teaching assignments. Teaching in the master's programme seems very rewarding and energizing for them. The panel praises the staff members' commitment to the students. Students experience the Science Park as a vibrant academic environment, with suitable study spaces for everyone.

### Considerations

The panel studied the curricula of the various tracks and concluded that the exit qualifications are adequately covered. The design of the overall curriculum is clear and well-structured. The panel also appreciates the level of freedom and flexibility in the programme. The content that is offered meets the standards of an academic master's degree.

The panel observed that the management of so many different tracks could be challenging. It encourages the management to continue paying sufficient time and attention to communication to maintain coherence in the programme and to ensure that written guidelines become more active. It also believes that the different tracks could benefit from knowledge of each other's best practices. Regarding the selection process, the panel advises the programme to evaluate whether the procedure is sufficiently transparent and to ensure that all prospective students receive adequate information on the aims and profile of the programme.

The panel compliments the programme for how it has implemented the previous panel's recommendations to provide more skills training to the students and to intensify its career development initiatives. It also believes that the programme's focus on internships and research projects is apt. Nonetheless, the panel noticed a gap between learning and applying in some instances and recommends paying attention to communicating with students about the internal cohesion within the programme. The panel believes the program is feasible, although it may be demanding to finish within the required two years. The panel experienced during its visit that the student adviser and track coordinators are greatly appreciated by the students and observed that the new position of track representatives has added considerable value to the social cohesion and satisfaction of the students.

The panel encourages the programme to evaluate whether more needs to be done to create a soft landing for international students and students from other Dutch universities. It also recommends improving guidance regarding obtaining internships particularly – but not only – for students from outside the UvA. The documents and interviews assured the panel that procedures around the final research projects are transparent and well-structured. The guidance and feedback provided during the projects are sound and appreciated by the students. The teaching staff is qualified and committed to the students. With the recent hiring of extra academic staff, the programme appears to be adequately staffed.

### Conclusion

The panel concludes that the programme meets standard 2.

### Standard 3. Student assessment

The programme has an adequate system of student assessment in place.

### Findings

Assessment takes place according to the regulations laid down in the assessment policy of the UvA and the *Assessment Plan Master's Programme Biomedical Sciences (July 2023)*. The *Matrix Learning Outcomes Teaching Methods Exit Qualifications BMS* shows how the teaching activities and forms of assessment relate to the intended learning outcomes. Forms of summative assessment, as reflected in the matrix, are written examination, essay or abstract, report/research proposal/assignment, thesis, presentation, practicals, participation, and discussion.

Examiners of courses, of research projects, and of literature reviews are annually reviewed and appointed by the Examinations Board. The curriculum and assessment outline for the programme are described in its *Teaching and Examination Regulations (TER)*. In addition, the detailed *Assessment Plan* programme provides staff with guidelines on, among other things, formative and summative assessment; tasks and roles of examiners, assessors, and supervisors; assessment of the literary review; assessment of the research project; and the role and tasks of the Examinations Board. For each programme component (i.e., course, research project, or literature review), the course descriptions in the study guide contain information for the students on the learning objectives, teaching methods, and the methods of assessment (formative and summative).

The panel has studied the TER, the learning objectives, the assessment plan, the information on assessment in course descriptions in the study guide, and a selection of assessments with their corresponding grading forms. Based on this information and the meetings during the site visit, the panel concludes that assessment in all the tracks under review adequately covers the learning objectives and intended learning outcomes (ILOs). The panel thinks that the methods of assessment are varied and the quality of assessment in the programme is adequate. It is generally valid, reliable, and transparent.

#### *Assessment of the research project*

Students in the regular tracks complete the master's programme in the second year with the second research project as the final project. Students who follow one of the majors complete the first year of their curriculum with the first research project and the second year with a final project specific to their major.

The final assessment of the research project takes place according to standard evaluation forms. In the research projects, assessments of practical work (60%), a written report (30%), and oral presentation (10%) are weighed to provide the final grade, and each of these individual components must be passed with a minimum grade of 5.5. The assessor of the research project suggests a grade to the examiner, who is eventually the person responsible for determining the grade. The examiner reads and grades the report independently from the assessor, taking into account the rationale of the assessor. The examiner also checks the plagiarism report using an online tool. The assessor needs to have ample experience in the supervision and assessment of student projects but is not necessarily a FNWI staff member (cf. Standard 2, *Supervision of the research project*). However, the examiner is a BKO-certified FNWI staff member with a doctoral degree who is appointed as an examiner for research projects by the Examinations Board. The examiner is not involved in the research line in which the research project is executed. This procedure helps enforce a consistent standard of assessment for the entire programme. If the gradings of the assessor and examiner differ by more than 1.0 points, the examiner contacts the assessor, which usually results in a reassessment. If no agreement is reached, the examiner will appoint a third assessor to determine the grade based on the final report. However, the examiner is responsible for the grade and has the final say in grading. The final projects of students following the majors outside FNWI are graded according to the protocols of the respective major or institution.

The panel read the documentation and noted with satisfaction that the process of assessing the final projects is well-designed, transparent, reliable, and valid. It also read a representative sample of 15 final reports divided over the different specializations and majors and assessed them. In general, the panel members agreed with the final grades given by the reviewers. Notwithstanding the overall quality of the assessments, the panel noted that the quality and amount of feedback differed quite considerably. The panel considers the quality and amount of feedback to be very important for the student's learning process and for maintaining assessment quality as it also provides underpinning for the grading. On that same note, the panel was surprised by the guideline stating that written feedback is only requested in cases when the grade is higher than an 8. The panel, therefore, advises developing and enforcing a guideline for assessors

and examiners that ensures sufficient written feedback and substantiation of the grades by both and for all students.

#### *Quality assurance and Examinations Board*

The Examinations Board of the Biomedical Sciences programmes is a subcommittee of the overarching Examinations Board of Earth and Life Sciences (EB-ALW)<sup>2</sup>, in which the chairs of the subcommittees Biology, Psychobiology and Biomedical Sciences are represented. The overarching ALW committee has one external member. The Biomedical Sciences Subcommittee consists of a chair and four members. All members are appointed by the dean. In speaking with the panel, the Examinations Board<sup>3</sup> indicated that, after several difficult years, it is now well-assisted in terms of resources and support. The panel welcomes this development and stresses the importance of continuing sufficient support for the Examinations Board.

The Examinations Board is, among other things, responsible for the quality assurance of assessments within the programme. Its operating procedures are outlined in the document *Werkwijze Kwaliteitsborging Examencommissie ALW*. The panel read with satisfaction that, to ensure the quality of assessments, the board selects five courses per year for the bachelor and master programme combined, based on several formulated indicators, such as fail/pass rates and random samples. Of these courses, the examination board studies the course file and then discusses with the course coordinator all aspects important for the quality of the assessments. Each new course is also evaluated two to three years after its introduction. Cases are discussed in a meeting with the chairs of the various subcommittees, which contributes to the quality of assessment.

Twice a year, the Examinations Board informs the programme director about the assessment checks and indicates when there is a need for corrections or improvements. The board further advises the programme director about the contents of the Assessment Plan and its annual update. The board also randomly selects a sample of the research projects and literature reviews each year and assigns 4–5 reports to each member of the Examinations Board. For each report, a FNWI-appointed examiner (who was not involved in the project) is asked to give a grade using a standardized form. Large discrepancies between assessments (more than one point) are investigated by discussions with the examiner. According to the panel, the monitoring activities of the Examinations Board are an adequate instrument to ensure the quality of assessment within the master's programme.

The overarching EB - ALW has introduced a new working method to equalize and streamline the process of assuring the assessments of the ALW courses. This working method should also make it easier for the different sub-committees to support each other and to make faster improvements. One of the innovations is that members of the board discuss the outcomes of the quality audits of courses directly with the course coordinators. The panel considers this a positive development and is pleased that the first discussions have now taken place. The panel is also pleased to see that the assessment plan contains other important guidelines to assure the quality of assessment in the master's programme, such as criteria for the appointment of examiners, the use of assessment matrices, peer review in the construction of exams, and the use of rubrics to assess assignments.

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<sup>2</sup> ALW is the Dutch acronym for 'Aard- en Levenswetenschappen', meaning Earth and Life Sciences.

<sup>3</sup>For the sake of readability, hereafter the name Examinations Board refers to the Biomedical Sciences Subcommittee

For the majors offered at the VU, the EB-ALW works with the VU Amsterdam Examination Board on the basis of mutual transparency and trust. The boards of both institutions have annual formal contact to discuss topics such as the quality assurance of assessments and research projects and the exchange procedures for the courses offered at each university. This is important to remaining informed about the procedures and methods at the other university. The EB-ALW determines whether each student is qualified to follow a major and whether the major programmes are accredited within the accreditation procedure of the programme in question. Quality assurance of assessment within the majors is performed by the examination boards of the associated MSc programmes. The panel is satisfied with these arrangements.

Based on the interview with the Examinations Board, the annual reports of the board, and other relevant documents, the panel found that the Examinations Board adequately safeguards the quality of assessments and the level achieved within the programmes. The board is continuing to strengthen itself and its position within the organization, which the panel wholeheartedly supports. It is important that the organization continues to guard the independence of the committee and that other sections, such as the Board of Studies (cf. Standard 2), continue to provide the EB with sufficient information.

#### Considerations

Based on this information and the meetings during the site visit, the panel concludes that assessment in all the tracks under review adequately covers the learning objectives and intended learning outcomes. The panel considers the methods of assessment to be varied and the quality of assessment in the master's programme is adequate. It is generally valid, reliable, and transparent.

The panel read a representative sample of final reports and observed that, in general, it agreed on the final grades given by the reviewers. The panel noted with satisfaction that the process of assessing the final projects is well-designed, transparent, reliable, and valid. Notwithstanding the overall quality of the assessments, the panel noted that the quality and amount of feedback differed quite considerably. The panel, therefore, advises the development and enforcement of a guideline for assessors and examiners that ensures sufficient written feedback and substantiation of the grades for all students, also when their grade is equal to or lower than 8.

The panel observed with satisfaction that the Examinations Board feels well-assisted in terms of resources and support. Based on documentation and the interview with the Examinations Board, the panel concludes that the board adequately safeguards the quality of assessments and the level achieved within the programmes. The panel supports the continuing efforts of the board to strengthen itself and its position within the organization. It stresses the importance of the organization continuing to guard the independence of the committee and that other sections, such as the Board of Studies (cf. Standard 2), continue to provide the Examinations Board with sufficient information.

#### Conclusion

The panel concludes that the programme meets standard 3.

## Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

### Findings

The panel studied a representative selection of 15 final research projects. This selection included at least one research project from every track as well as final projects of all the majors (excluding the teaching major, which was covered during the accreditation of the teacher education master's degree at the UvA). Based on that selection, the panel concludes that all final projects demonstrate the realization of the programme's intended learning outcomes. The projects, both of the tracks and of the majors, are clearly at the level that can be expected from a master's research project in the field of biomedical sciences and are often of high quality. The projects also clearly reflect the various research interests of the 11 tracks. Most students conducted their research in internationally renowned institutes, both in the Netherlands and abroad, which gives them an excellent starting position in the labour market.

According to the Alumni Survey, the vast majority (94%) of graduates have found a position within a year or continued with another educational programme, mostly an MSc in Medicine. A majority of the master's degree students (51%) continue in PhD positions, 12% pursue a research career outside academia, and 37% find a first job in a non-profit, commercial, or other organization. In the same survey, the alumni gave the programme an average score of 7 points out of 10 for support in the preparation for future employment. The panel is pleased to see that the initiatives implemented by the programme to better prepare students for their future employment (both in research as elsewhere) since the last visitation seem to have been effective, which is demonstrated by a rise in score for this question in the NSE ('Nationale Studenten Enquête'), from 43.3% in 2021 to 64.2% in 2022.

The panel learned from the preparatory documents that upon completion of the master's programme, graduates are in a good position to begin an academic career as a PhD student or pursue a career outside academic research in line with the training provided by the majors and minor.

### Considerations

In the panel's view, the final works studied by the panel show that the graduates achieve the intended learning outcomes. The projects are clearly of the level expected from a master's research project in the field of biomedical sciences and are often of high quality. They reflect the fact that many of the research projects are the result of internships at leading (inter)national institutes. Graduates are in a good position to commence an academic career as a PhD student or pursue a career outside academic research. The vast majority (94%) of the students found a position within a year or continued with another educational programme. The initiatives taken by the programme to better prepare students for employment since the last visitation seem to have been successful, resulting in more students indicating that the programme prepares them well for future employment.

### Conclusion

The panel concludes that the programme meets standard 4.

### General conclusion

The panel's assessment of the master's programme Biomedical Sciences is positive.

## Development points

1. Prioritize bringing the majors more clearly to the attention of the students and teaching staff.
2. Make the issue of alternatives to animal experiments more visible in the programme.
3. Evaluate whether the selection procedure is transparent enough – especially for those who do not come from the local bachelor's degree programme – and ensure that all prospective students receive adequate information on the aims and profile of the programme.
4. Improve guidance on obtaining internships particularly – but not only – for students from outside the UvA.
5. Pay attention to communicating with students about the internal cohesion within the programme and about the link between acquired theoretical knowledge and application of it in practice.
6. Evaluate whether more work is needed to make the international students and other students who are new at the UvA familiar with procedures and to facilitate their integration.
7. Develop and enforce a guideline for assessors and examiners of the research projects that ensures sufficient written feedback and substantiation of the grades for all students.

## Appendix 1. Intended learning outcomes

(Article B-2.2 – Exit qualifications; Teaching and Examination Regulations 2021-2022)

1. The graduate of the Master's programme Biomedical Sciences has *[between brackets the most associated Dublin descriptor(s)]*:
  - a) the ability to read up on and master current scientific research developments and have knowledge of current scientific developments within relevant biomedical research *[Knowledge and understanding]*;
  - b) the analysing, problem-solving and synthesising abilities in order to deal with current scientific knowledge in medical biology and/or neurobiology and apply this knowledge in new and continuously changing practical situations, also in broader, multidisciplinary contexts *[Applying knowledge and understanding]*;
  - c) both a broad basic medical biological and/or neurobiological as well as specialist knowledge of one or more sub-areas of biomedical sciences, as basis or opportunity for originality in developing and/or applying ideas *[Knowledge and understanding]*;
  - d) the ability to formulate questions on the frontline of scientific research *[Knowledge and understanding, Applying knowledge and understanding, Making judgements]*;
  - e) the ability to formulate realistic and falsifiable (research) hypotheses, based on incomplete, limited or complex information and translate this into a research proposal *[Knowledge and understanding, Applying of knowledge and understanding, Making judgements]*;
  - f) the ability to independently set up and conduct biomedical experiments and laboratory measurements contributing to a line of research *[Applying of knowledge and understanding, Learning skills]*;
  - g) the skills to present research plans and results, orally or written, in English, at various scales and levels of abstraction, and communicate these to specialist and non-specialist audiences *[Communication]*;
  - h) the skills to analyse and interpret biological patterns and processes in both a qualitative and quantitative sense *[Applying of knowledge and understanding]*;
  - i) the ability to get acquainted with a field of study in a short period of time by self-study, to form one's own opinion and to write a critical essay in a set period of time *[Making judgements]*;
  - j) the ability to integrate the many hierarchical levels present in medical biology and/or neurobiology, and understands the interactions between biomedical sciences and other sciences *[Making judgements]*;
  - k) the ability to fulfil a position in society requiring an academic qualification as an independently operating professional that has a good knowledge base and attitude towards a biomedical approach to relevant societal issues *[Learning skills]*;
  - l) an attitude that enables critical reflection *[Making judgements, Learning skills]*.
2. In addition to paragraph 1, the student finishing the track Cell Biology and Advanced Microscopy has obtained the following track-specific qualifications:



- the ability to interpret and evaluate current state-of-the-art research in the fields of cell biology and microscopy and to start an independent research project in this direction;
  - Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of cell biological processes and visualise these processes through microscopy is required.
3. In addition to paragraph 1, the student finishing the track Developmental and Therapeutic Biology has obtained the following track-specific qualifications:
- the ability to interpret and evaluate current state-of-the-art research in the field of developmental and therapeutic biology and to start an independent research project in this direction;
  - Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of developmental biology is required.
4. In addition to paragraph 1, the student finishing the track Experimental Internal Medicine has obtained the following track-specific qualifications:
- the ability to interpret and evaluate current state-of-the-art research in the field of experimental internal medicine and to start an independent research project in this direction;
  - Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of human organ physiology is required.
5. In addition to paragraph 1, the student finishing the track Infection and Immunity has obtained the following track-specific qualifications:
- the ability to interpret and evaluate current state-of-the-art research in the fields of infection and immunity and to start an independent research project in this direction;
  - Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of infectious and immunological processes is required.
6. In addition to paragraph 1, the student finishing track Medical Biochemistry and Biotechnology has obtained the following track-specific qualifications:
- the ability to interpret and evaluate current state-of-the-art research in the fields of biochemistry and biotechnology and to start an independent research project in this direction;
- Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of biochemical processes is required.
7. In addition to paragraph 1, the student finishing the track Oncology has obtained the following track-specific qualifications:
- the ability to interpret and evaluate current state-of-the-art research in the field of oncology and to start an independent research project in this direction;

- Has the know-how and research experience to act as a self-directed professional in an environment in which understanding of oncological processes is required.
8. In addition to paragraph 1, the student finishing the track Physiology of Synapses and Networks has obtained the following track-specific qualifications:
    - a solid knowledge of the basic disciplines that together form Neuroscience with a focus on the cellular and network level: cellular neurophysiology, synaptic communication, synaptic plasticity and anatomy;
    - solid understanding of memory formation and the cellular and network aspects that are corrupted in Alzheimer's Disease.
  9. In addition to paragraph 1, the student finishing the track Cognitive Neurobiology and Clinical Neurophysiology has obtained the following track-specific qualifications:
    - has obtained a solid knowledge of the basic and advanced disciplines that together form Neuroscience with a focus on the neural mechanisms underlying behaviour and cognition;
    - has obtained the ability to interpret and evaluate current state-of-the-art research on clinical neurophysiology, in particular on the field of brain imaging and neurophysiology of neuropsychiatric disorders
  10. In addition to paragraph 1, the student finishing the track Molecular Neurosciences has obtained the following track-specific qualifications:
    - a solid knowledge of the basic and advanced disciplines that together form Neuroscience with a focus on the molecular biology of neuronal systems, midbrain and cortex development and signal transduction;
    - solid understanding of neurodevelopment and neurodevelopmental disorders and a deepened understanding of relevant technologies applied within the field of molecular neuroscience.
  11. In addition to paragraph 1, the student finishing the track Psychopharmacology and Pathophysiology has obtained the following track-specific qualifications:
    - a solid knowledge of the basic and advanced disciplines that together form Neuroscience with a focus on putative neuronal substrates, mechanisms of action and deficits underlying the most important and/or common neuropsychiatric and neurological disorders.
    - has performed an internship where he/she obtained a deeper understanding of, and at least some practical experience with, some of the most commonly used research tools, models and approaches and analytical methods to study the potential substrates, behavioural responses and disease mechanisms implicated in these brain disorders.
  12. In addition to paragraphs 1 through 11, the graduate who has chosen to do a second research project in the field of biomedical sciences has the ability to continue his/her career either as a researcher able to pursue a PhD degree at world's best universities, as a scientist in research institutes worldwide, or as a research-skilled professional in an

organisation of government, civil society or business and industry.

13. In addition to paragraphs 1 through 11, the graduate who has chosen to do a major or minor as mentioned in article B-4.4.2, obtains the exit qualifications as listed in the appendix.

14. In addition to paragraph 1, the student finishing the Double Master's programme Medicine/Biomedical Sciences has obtained the following DuMA-specific qualifications:

- The ability to translate the observation of a clinical problem into a scientific research proposal.
- The ability to use biomedical knowledge in a clinical context.

# Appendix 2. Programme curriculum

MSc Biomedical Sciences 2022-2023 - year 1													
Period 1			Period 2			Period 3		Period 4		Period 5		Period 6	
September			October			November		December		January		February	
October			November			December		January		February		March	
November			December			January		February		March		April	
December			January			February		March		April		May	
January			February			March		April		May		June	
MEDICAL BIOLOGY CLUSTER	CBAM	Molecular Biology of the Cell (6EC) Maïke Stam	Advanced Microscopy (6EC) Mark Heik	Clinical Cell Biology (6EC) Eric Ralts (AMC)	From interdisciplinary Science to Business (6EC) Rik van der Vaen				Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				Laboratory Animal Course [art.9] (6EC) Rob de Heus
	CVS	Molecular Biology of the Cell (6EC) Maïke Stam	Heart Development, Function and Disease (6EC) Wimmar Simoons-Swales (AMC)	Vascular Development, Function and Disease (6EC) Vincent Christoffels (AMC)					Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
	DTB	Molecular Biology of the Cell (6EC) Maïke Stam	Shaping a Human (6EC) Rouf-Jari Ootari (AMC)	Making and shaping blood cells (6EC) Emile van den Akker (Erasmus)					Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
	EIM	Molecular Biology of the Cell (6EC) Maïke Stam	Neuroendocrinology and Translational Metabolism (6EC) Dries Kribben (AMC)	Gastrointestinal, Metabolic and Cardiovascular Disease (6EC) Aljo W. Vreije (AMC)	Microscopy & Flow Data Analysis (6EC) Eric Baka				Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
	I&I	Molecular Biology of the Cell (6EC) Maïke Stam	Advanced Immunology (6EC) Maïke van Nieuwenhuizen (AMC/Sanquin)	Advanced Medical Microbiology (6EC) Bas Zaat (AMC)					Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
	MBB	Molecular Biology of the Cell (6EC) Maïke Stam	Biomedical Systems Biology (6EC) Stavros Bral	Biotechnology (6EC) Filipe Branco dos Santos	The Human Microbiome in Health and Disease (6EC) VU				Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
	ONC	Molecular Biology of the Cell (6EC) Maïke Stam	Experimental Oncology (6EC) Roderick Beijersbergen (RIG)	Clinical Cell Biology (6EC) Eric Ralts (AMC)					Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
ALL	Academic Development - Zainal Habibham												
ALL	Literature Review (1 2EC) & Research Project(s) BMS 1&2 (total 72-96EC, depending on elective courses) Each Research Project min. 30EC - max. 60EC												
NEUROBIOLOGY CLUSTER	PSN	Neurophysiology (6EC) Natalie Coppoort	From Synapse to Network (6EC) Natalie Coppoort	From Network to Behaviour (6EC) Natalie Coppoort	MATLAB Applied to Neuronal Data (6EC) Mitsuki Suzuki				Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				Laboratory Animal Course [art.9] (6EC) Rob de Heus
	CN2	Advanced Cognitive Neurobiology and Clinical Neurophysiology (12EC) Jorge Mejias		Network Models, Representation and Consciousness (6EC) Cyril Pascanic					Current Issues in Developmental Biology (6EC) Renske van Amelsvoort				
	MNS	Neurodevelopment / Specification of Neuronal Systems (6EC) Marino Simili	Stem Cell Fate and Cortical Genesis (6EC) Marlo Hoekman	Signal Transduction Pathways in Neuronal Systems (6EC) Lars van der Heide					Neural Dynamics and Deep Learning (6EC) Jorge Mejias		Current Issues in Developmental Biology (6EC) Renske van Amelsvoort		
	PPP	Advanced Psychopathology (12EC) Aniko Kirovci		Methods and Techniques in Neurobiology (6EC) Aniko Kirovci	Brain Programming; Early-Life, Epigenetics and Environment (6EC) Aniko Kirovci		Current Issues in Developmental Biology (6EC) Renske van Amelsvoort						
	ALL	Academic Development - Zainal Habibham											
ALL	Literature Review (1 2EC) & Research Project(s) BMS 1&2 (total 72-96EC, depending on track and elective courses) Each Research Project min. 30EC - max. 60EC												
MSc Biomedical Sciences 2022-2023 - year 2													
Period 1			Period 2			Period 3		Period 4		Period 5		Period 6	
September			October			November		December		January		February	
October			November			December		January		February		March	
November			December			January		February		March		April	
December			January			February		March		April		May	
January			February			March		April		May		June	
ALL	Literature Review (1 2EC) & Research Project(s) Biomedical Sciences 1&2 (total 72-96 EC depending on track and elective courses) Each RP min. 30 EC - max. 60 EC												
ALL	Professional Skills (2 courses of 1,5 EC each) in year 1 & 2												
MAJOR BBDA	Genomics (6EC) Marlijn Jonker	Transcriptomics (6EC) Marlijn Jonker	Proteomics and Metabolomics (6EC) Geert Klumper	Research Project Biomedical Sciences, major BBDA (42EC)									
OTHER MAJOR	Major Programme (VU or ILO)												

Compulsory components with fixed planning

Compulsory components with free planning

Elective courses: \*Note: most electives can be chosen in any track. Courses may have entry requirements, see the Course Catalogue for details.

Disclaimer: no rights can be derived from this programme

## Appendix 3. Programme of the site visit

### 20 oktober 2023

10.00 11.30 Online vooroverleg panel & online inloopspreekuur

### 30 oktober 2023

10.45 11.00 Welkom  
11.00 11.30 Overleg panel  
11.30 12.15 Gesprek inhoudelijk verantwoordelijken  
12.15 12.45 Lunch  
12.45 13.15 Overleg panel  
13.15 13.45 Rondleiding  
13.45 14.30 Gesprek BSc studenten  
14.30 15.15 Gesprek BSc docenten  
15.15 15.45 Pauze  
15.45 16.30 Gesprek MSc studenten  
16.30 17.15 Gesprek MSc docenten  
17.15 17.30 Pauze  
17.30 18.00 Gesprek alumni  
18.00 Afsluiting

### 31 oktober 2023

09.00 09.30 Overleg panel  
09.30 10.15 Gesprek examencommissie  
10.15 11.15 Themasesie 1: Gebruik van zichtbare leerlijntool & onderwijsvorm  
11.15 12.15 Themasesie 2: BBDA Major & cursus Rixt  
12.15 13.00 Lunch  
13.00 13.30 Overleg panel  
13.30 14.00 Eindgesprek formeel verantwoordelijken  
14.00 16.00 Opstellen voorlopige bevindingen & voorbereiden mondelinge rapportage (panel)  
16.00 16.30 Mondelinge rapportage voorlopig oordeel  
16.30 17.30 Borrel

## Appendix 4. Materials

Prior to the site visit, the panel studied 15 theses. Information on the theses is available from Academion upon request. The panel also studied other materials, which included:

- Critical Reflection MSc Biomedical Sciences
- Annual reports and plans of the programme from 2019 until 2023
- Annual Report Examinations Board ALW 2021-2022
- Assessment Plan MSc Biomedical Sciences
- Matrix Learning Outcomes Teaching methods Exit qualifications
- Procedure of Quality Assurance Examination Board (in Dutch)
- Staff list 2021-2022
- SWOT-analysis students
- Teaching and Examination Regulations 2021-2022



# NVAO

## Onderwerp

Bij accreditatie bestaande opleiding aan te leveren administratieve gegevens.

## Datum

2018

## Versie

1.0

De NVAO verzoekt u onderstaande gegevens in te vullen en bij de aanvraag in te dienen.

### *Instelling*

Naam instelling	Universiteit van Amsterdam
BRIN-code CROHO	21PK
Status instelling	x bekostigd 0 rechtspersoon voor hoger onderwijs
Resultaat instellingstoets kwaliteitszorg	0 n.v.t. x positief 0 positief onder voorwaarden 0 negatief 0 nog niet afgerond

### *Opleiding*

Naam opleiding in Centraal Register Opleidingen Hoger Onderwijs (CROHO)	<b>M Biomedical Sciences</b>
ISAT-code CROHO	66990
Oriëntatie en niveau opleiding	0 hbo x wo
Niveau opleiding	0 associate degree 0 bachelor x master
Voor opleidingen in het hoger beroepsonderwijs de te hanteren toevoeging aan de graad. Zie de ministeriële regeling en de daarin vervatte referentielijst Stert. 2013, 35337) en de uitwerking daarvan door de NVAO (. Afwijkingen moeten worden gevalideerd door het visitatiepanel	n/a
Aantal studiepunten	120

Variant(en) incl. een evt. 3 jarig traject voor VWO bij een hbo-bacheloropleiding	voltijd
Eventueel nieuwe naam	n/a
Afstudeerrichtingen	n/a
Eventueel nieuwe afstudeerrichtingen	n/a
Opleidingslocatie(s)	Amsterdam
Joint programme (indien van toepassing), met opgave van de betrokken partnerinstellingen en het type graadverlening (joint/double/multiple degree)	n/a
Onderwijstaal	Engels
Bijzonder kenmerk (indien van toepassing)	n/a

### Overig

#### Contactpersoon aanvraag

Voornaam	Marlies
Tussenvoegsel(s)	
Achternaam	Doeven
Telefoonnummer	
E-mailadres	m.doeven@uva.nl

#### Factuuradres (indien anders dan postadres instelling)

Factuuradres	Universiteit van Amsterdam, Postbus 19268
Postcode factuuradres	1000 GG
Plaats factuuradres	Amsterdam
Referentie instelling (nummer/inkoopbon/afdeling etc.)	<a href="mailto:factuur@uva.nl">factuur@uva.nl</a> UvA t.a.v. crediteurenadministratie/Roos Eggers met vermelding kostenplaats: 10001 (Academische Zaken UvA)
E-mailadres bij digitale facturering	<a href="mailto:factuur@uva.nl">factuur@uva.nl</a>

#### Eventuele opmerkingen

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