



MSc Biomedical Sciences
Vrije Universiteit Amsterdam

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info@academion.nl

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Summary

Standard 1. Intended learning outcomes

The MSc Biomedical Sciences has a strong research profile and aims to allow students to broadly orientate themselves towards biomedical research and society through seven relevant specialization fields. The arrangement in which students graduate in two specializations rather than one adds a unique profile to the programme. Simultaneously, the added value of a combination of two specializations could be explored and made more explicit. The panel considers the connection between biomedical sciences and society to be a strong aspect of the programme and suggests investigating whether this could be strengthened as part of the programme's profile. The panel supports the envisioned reflection on the programme's aims and considers it a suitable starting point. The programme's general and specialized learning outcomes are well-formulated, clearly demonstrate an academic master's level and align with academic and professional expectations.

Standard 2. Teaching-learning environment

The MSc BMS curriculum has a clear structure with one specialization pursued each year, complemented by core course components. The panel is particularly impressed with the multidisciplinary integration course and the Study and Career trajectory that helps students reflect on their curriculum choices in relation to their ambitions. The strong research focus is reflected in the courses and the two research internships that constitute half of the curriculum. The biomedical disciplinary and societal specializations are coherent. However, the panel recommends investigating whether the integration between both specializations could be improved so that they build upon each other and whether more common ground can be found in the curriculum. The programme is taught in English, which aligns with the research field's international orientation and the global labour market. Sufficient attention is given to English language proficiency among staff and students.

Students are well-supported and the curriculum is generally feasible. Most of the students graduate after two to three years. Even so, the panel thinks that there are opportunities for further improving the feasibility of the curriculum. It suggests for example investigating the literature thesis' place in the curriculum and providing appropriate prior knowledge required for the specialization courses to improve the feasibility. The panel advises to involve the students in optimizing the feasibility. Furthermore, the process of finding suitable internships and supervisors should be carefully monitored to prevent study delays in the competitive context of student internships. The programme has sufficient teaching staff who are suitably qualified and able to connect their teaching to state-of-the-art research.

Standard 3. Student assessment

The panel is satisfied with the master's programme's clear and transparent assessment policy and practice and found it an efficient and firm assessment procedure that supports students by making assessments clear, transparent and accessible and aids teachers in making well-founded assessment decisions. The panel studied the master's thesis assessment procedure and concluded that it is transparent and robust. The programme has a solidly functioning examination board that understands its tasks and responsibilities and is accountable for them. The panel advises the examination board to continue monitoring alignment between the assessment matrix and the actual assessment plans of individual courses.

Standard 4. Achieved learning outcomes

The panel finds that the master's theses and alumni employment prospects demonstrate that the programme's learning outcomes are achieved by students in all specializations. Students find relevant positions in (medical) research institutes, industry and societal organizations.

Score table

The panel assesses the programme as follows:

M Biomedical Sciences

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. Hans van Leeuwen
Chair

Jessica van Rossum MSc
Secretary

Date: 22 December 2023

Introduction

Procedure

Assessment

On 4 and 5 October 2023, the master's programme Biomedical Sciences of the Vrije Universiteit Amsterdam was assessed by an independent peer review as part of the cluster assessment Biomedical Sciences. The assessment cluster consisted of 18 programmes, offered by Wageningen University, 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 Hildering and Jessica van Rossum acted as coordinator and Annemarie Venemans, Hester Minnema 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 integrated into 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 period 2020 – 2022. In consultation with the coordinator, the panel chair selected 15 theses. He took the diversity of final grades and examiners into account, as well as the various tracks and majors. The Education specialization was considered during the accreditation of the Master Leraar VHO in de Bètawetenschappen (ISAT 68533) in 2021, and will not be discussed in-depth in this accreditation.

Prior to the site visit, the programme provided the panel with the theses and the accompanying assessment forms. The panel members also received the relevant documentation from the programme, consisting of an extensive set of current documentation pertaining to the four standards of examination that, together with a programme description and SWOT analysis, served as self-evaluation report. An overview of these materials can be found in Appendix 4.

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 an Academion colleague for peer assessment. Subsequently, the secretary sent the report to the panel for feedback. After processing this feedback, the secretary 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 Vrije Universiteit.

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;
- Prof. 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 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;
- Prof. dr. Maud Huynen, assistant professor Planetary Health, Maastricht University;
- Emma van Wijk BSc, master student Biomedical Sciences, Radboud University – student member;
- Dr. Jur Koksma, assistant professor Transformative Learning, Radboud University – referee.

Information on the programme

Name of the institution:	Vrije Universiteit Amsterdam
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:	Immunology Infectious Diseases Neurobiology International Public Health Science Communication Science in Society Education
Location:	Amsterdam
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	1 May 2024

Description of the assessment

Previous accreditation panel's recommendations

The documentation includes an overview of how the programme management has followed up on the recommendations given by the previous accreditation panel (2018). Furthermore, several recommendations and their follow-up actions were discussed with the programme management during the site visit. The panel concludes that the programme management has genuinely acted upon the recommendations. The panel is satisfied with the improvement measures and recognizes that these have improved the quality of the programme. The programme management is still in the process of addressing some recommendations. These issues are described in this report.

Standard 1. Intended learning outcomes

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

Findings

Profile and aims

The MSc Biomedical Sciences (BMS) is organized in the domain of Health and Life Sciences in the Faculty of Science at the Vrije Universiteit Amsterdam in close collaboration with the Amsterdam University Medical Centre (AUMC). It aims to train future biomedical scientists to conduct research within the wide spectrum of biomedical sciences, either within the discipline or at the interface between science and society. As biomedical issues become increasingly complex, the programme aims to teach its students how different disciplines contribute to addressing these issues and equip them with knowledge, skills and competencies in two subdisciplines of biomedical sciences and their integration. This aim is strongly embedded in research; courses, assignments and projects are typically related to the teaching staff's ongoing research interests. The programme is relatively small-scale, with an intake of approximately 50 students annually, allowing for interactive and intensive education.

Students choose two specializations as part of the programme. They can choose between three biomedical disciplinary specializations related to the research specialisms of VU/AUMC: immunology, infectious diseases and neurobiology.

- *Immunology* covers immunological processes ranging from molecular and cellular interactions between hosts and pathogens to an integrative knowledge of the immune system's role in various pathologies, such as cancer, infectious diseases and autoimmunity.
- *Infectious Diseases* provides students with a broad understanding of the medical microbiology of pathogenic organisms and interactions between pathogens and hosts.
- *Neurobiology* is a selective specialization with a maximum of 10-25 enrolled students. It concerns knowledge, insight and understanding of the physiology and science of the brain.

Students can also choose one of the societal specializations International Public Health (IPH), Science Communication, Science in Society (SiS) and Education. The first three are organized by the Athena Institute in the Faculty of Science. Education is organized in the Faculty of Behavioural and Movement Sciences.

Science Communication, Science in Society and Education are faculty-wide specializations, meaning that students follow their specialization courses with students from other MSc programmes in the faculty. Science Communication and SiS are organized by the VU, and are also offered to students of the University of Amsterdam.

- *IPH* integrates various disciplines, including epidemiology, policy science, anthropology, management studies, biomedical sciences and health sciences, to discuss current and future challenges in international public health, their main causes, and applied and potential interventions. It is a specialization shared with the MSc Health Sciences and the MSc Management, Policy Analysis and Entrepreneurship in the Health and Life Sciences (MPA).
- *Science Communication* gives insights into the fundamentals of science, communication and science communication, teaching students to understand communication processes between scientists of different disciplines, scientists and their stakeholders, and scientists and citizens.
- *SiS* provides tools and strategies for understanding and approaching complex societal problems concerning scientific and technological development. It teaches students how to identify, analyze and manage such complex societal problems.
- *Education* consists of the one-year MSc Leraar VHO Bètawetenschappen, allowing students to obtain a first-degree teaching qualification in Biology. The content of this specialization was considered in the educational programme's accreditation at the VU in 2021 and is not discussed in depth in this report.

The panel studied the profile and aims of the MSc BMS and discussed these with various programme representatives. It concludes that the programme has a strong research profile that aims to educate graduates with a broad orientation towards biomedical sciences and society. The fact that students choose two different specializations contributes to their broad profile, which is a strong characteristic of the programme. The three biomedical disciplinary specializations and four societal specializations are coherent and relevant and contribute to the training towards disciplinary and interdisciplinary biomedical scientists. At the same time, the panel believes that the programme could elaborate on its overall profile and the way the seven specializations and combinations of these specializations contribute to this profile.

Following the previous accreditation panel's recommendations, the programme management has worked more closely on connecting the final works of the societal specializations to the BMS profile, resulting in additional requirements to include biomedical components in the internships of these specializations. The panel appreciates this and encourages the programme management to take the next step and embed these specializations into the overall programme vision, articulating what they specifically offer BMS students. It values that to this end, the course Integrated Biomedical Sciences has been included in the curriculum. The panel understands that students in the societal specialization sometimes experience the specialization courses as disconnected from the BMS courses, whereas the panel believes that the societal orientation could be one of the programme's unique selling points. The panel considers that students selecting two biomedical disciplinary specializations could also benefit from competencies related to policy and communication, especially if they intend to pursue a career outside academia. The panel understands that the programme management is currently reflecting on the programme's overall aims. The panel supports this and suggests to continue consulting external stakeholders, such as the professional field, in this reflection and formulating a narrative and several of the programme's unique selling points regardless of a student's chosen specialization.

Intended learning outcomes

The MSc BMS's aims have been translated into a set of general and specialization-specific learning outcomes. The general learning outcomes have been formulated alongside the five Dublin descriptors for academic

master's programmes and describe the general knowledge, skills and attitudes required of graduates. The seven sets of specialization-specific learning outcomes complement these general learning outcomes with knowledge and understanding of the specific field. The panel studied the learning outcomes and concluded that they are appropriate for an academic master's programme, as demonstrated in their alignment with the Dublin descriptors. They also comply with the domain-specific framework of reference formulated by the Dutch Biomedical Sciences programmes, aligning the programme's aims with academic and professional expectations.

Considerations

The MSc Biomedical Sciences has a strong research profile and aims to allow students to broadly orientate themselves towards biomedical discipline and society through seven relevant specialization fields. The arrangement in which students graduate in two specializations rather than one adds a unique profile to the programme. Simultaneously, the added value of a combination of a biomedical disciplinary specialization combined with a societal specialization could be made more explicit. The panel considers the connection between biomedical sciences and society to be a strong aspect of the programme and suggests investigating whether this could be strengthened and highlighted even more as part of the programme's profile. The panel supports the envisioned reflection on the programme's aims and considers it a suitable starting point. The programme's general and specialized learning outcomes are well-formulated, clearly demonstrate an academic master's level and align with academic and professional expectations.

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 first year of the MSc BMS curriculum comprises a combination of general compulsory courses (12 EC), courses related to the chosen biomedical disciplinary specialization (18 EC) and a research internship (30 EC). Students choose one of the three biomedical disciplinary specializations at the start of the curriculum. Each biomedical disciplinary specialization has a set of compulsory and elective courses that students follow in the first half of Year 1. The general compulsory courses in the first year include Integrated Biomedical Sciences, Ethics in Life Sciences and Scientific Writing in English (12 EC). The integration course was introduced in 2022 to enhance multidisciplinary in the programme and promote cohort formation among students in various specializations and addresses a recommendation by the previous accreditation panel to strengthen community building. The first year concludes with an internship associated with the biomedical disciplinary specialization; this can be completed in one of the VU/AUMC research groups, a closely related external institute, such as NKI or Sanquin, or abroad. Students conduct an individual research project under the supervision of a scientific staff member and write a report on their findings. For students who follow a societal specialization in the second year, this internship is considered to be the final product of the biomedical part of the curriculum.

In the second year, students choose a second specialization and can opt for one of the four societal specializations instead of a second biomedical disciplinary specialization. The biomedical disciplinary specializations follow the same structure as those in the second year with 18 EC of compulsory and elective courses complemented by a compulsory literature thesis (9 EC) and the career orientation course Study and Career (3 EC). The societal specializations (with the exception of Education, which has a separate 60 EC curriculum) have a 18 EC specialization-specific curriculum consisting of interdisciplinary courses and research methods relevant to the specialization. Students who choose the Science Communication or Science in Society specializations follow part of the curriculum of the first year of the two-year master's programme, Management Policy Analysis and Entrepreneurship in the Health and Life Sciences (MSc MPA, accredited in 2019). All specializations are completed with a second 30 EC research internship that serves as one of the final products of the programme. In the biomedical disciplinary specializations, this internship has a similar format to that in the first year. In the societal specializations, students typically engage in external internships focusing on complex societal problems, either in government organizations, companies or research institutes. IPH students typically do their research internships with an international focus. The full curricula of all specializations are provided in Appendix 2.

The panel studied the programme curriculum, including that of the individual specializations, and several course materials. It concludes that the curriculum has a clear structure and is an appropriate translation of the learning outcomes of the programme and the individual specializations. The panel was particularly impressed with the integration course, which provides students with insights into integrating different biomedical disciplines and is a common base for MSc students of all specializations. Next to that, the programme management noticed that the course contributes to cooperation and integration of teaching staff, since by working together in this course, teaching staff gets to know each other and each other's expertise more. The curriculum has a strong research focus, reflected in the two research internships, giving students ample opportunity to obtain hands-on experience and develop their research skills. The courses also strongly integrate theoretical and applied components. The societal specializations are coherent, transdisciplinary educational units that provide a combination of theoretical, practical and research content. The societal research internships allow students to integrate their knowledge and skills in relevant external arenas such as journalism, museums, government, pharmaceutical companies and medical organizations.

Students reported to the panel that they appreciated the opportunity to construct a curriculum based on their personal preferences and combine two different specializations. However, students found that the consequence of this is that the curriculum tends to be divided into two halves, and it largely falls to the student to integrate them. This issue is most prominent when a student follows a societal specialization but can also be the case for students who follow two biomedical disciplinary specializations. The programme management is currently discussing internally how to further integrate the two phases of the curriculum. The panel suggests the programme management to investigate whether more common ground can be found in the curriculum, creating more opportunities for both specializations to build upon each other. The integration course in the first year is an excellent example of a step in this direction, and the panel encourages the programme management to explore additional options. Considering that the curriculum currently offers very limited opportunity for core courses next to the specialization, the balance between the core and specialization components of the curriculum may need to be reconsidered.

Language and internationalization

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 academic staff recruitment requirements. Students appreciate that the programme is

taught in English. Foreign students entering the programme (currently comprising approximately 10% of the student population) must meet English language proficiency requirements as part of their admission. Moreover, students are adequately supported in developing their academic writing in English in the Scientific Writing in English course. The panel suggests to pay attention to parts of the curriculum (e.g. about Dutch health care system) that are conducted in Dutch and translate this to English, to make sure this is also available for international students.

Feasibility and guidance

The programme management ensures that students enter the programme with the necessary knowledge and skills to complete the curriculum. Students are required to have a relevant BSc degree in biomedical sciences with at least 24 EC in molecular biology and 24 EC in human biology, a BSc project on a biomedical research question and a 7.0 or higher grade for the relevant courses. Students who wish to enter the Neurobiology specialization are required to have followed a BSc course or internship in the field as a minimum. Other students can be admitted by the admission board based on their knowledge and insights demonstrated in an interview. These entrants include students with an HBO bachelor's degree and students who do not meet the 7.0 average grade requirement. These admission criteria allow the programme to build upon a shared knowledge base.

During the programme, feasibility is promoted by creating a supportive learning environment tailored to making curriculum choices, which can sometimes be challenging for students. Students can consult the master's or specialization coordinator for help and advice regarding curriculum choices and turn to the study advisor for advice on personal matters. The programme offers a Study and Career trajectory throughout the curriculum to help students make choices about their specialization and internships and orientate themselves towards their future careers. It consists of five workshops and a project, through which students create a portfolio reflecting on their future careers and developing the associated soft skills and competencies. The Study and Career trajectory includes an internship symposium, in September, where students can familiarize themselves with internship possibilities. Students are supervised by a VU supervisor during their internship. In the case of an external internship, there is also an on-site supervisor from the internship organization. All internships should have a daily supervisor, which can also be the VU or on-site supervisor. The internship project must be approved by the VU supervisor, and the organization and supervisor must be approved by the programme coordinator, who checks that the internship organization can provide sufficient academic quality and daily supervision.

In general, students take between two and three years to complete the programme. In 2022, 20% of students nominally graduated in two years, whereas 73% of the student population graduated after three years. The panel appreciates the attention to feasibility and student support provided in the programme. The admission requirements help ensure that students do not encounter difficulties completing the curriculum. Furthermore, sufficient attention is given to helping students shape their curriculum. The panel particularly appreciates the Study and Career trajectory and thinks it is highly relevant for encouraging students to think about their ambitions and possibilities throughout the curriculum. Students mentioned that they liked the trajectory but also felt there was potential to improve it. They suggest that it could be insightful to ask alumni to contribute to the workshops so that students can learn from their career choices. The panel supports this request and advises to engage both students and alumni in the improvement of the Study and Career trajectory.

The completion rates after three years are at an acceptable level. However, the panel advises the programme management to investigate the causes behind the low number of students completing the curriculum nominally. Several students indicated to the panel that they struggled to complete all the curriculum

elements in time; completing the literature thesis in conjunction with the courses in the second year was particularly challenging for some students. Others mentioned that they sometimes felt they did not have sufficient prior knowledge to follow a course, especially the specialization courses, and must catch up on their own account. The panel advises the programme management to investigate these concerns and consider the results in future curriculum improvements. During the development dialogue, the panel and programme brainstormed about a revision of parts of the curriculum, and the panel learned that the programme is implementing improvements. The panel values that the programme works on adjusting the literature thesis to a course as explicit part of the curriculum offered several times a year.

Another possible cause of delay is the challenge of finding a suitable internship position. Internal internships are in particular high demand. The panel recognizes that the programme supports students through the internship symposium. It also learned that the programme shares internal and external internship vacancies with students to help them find a position. Students told the panel that, although they encountered difficulties, they usually succeeded in finding an internship position. The panel encourages the programme management to continue their efforts and suggests striving to find more vacancies outside the Amsterdam region to increase the options for students. Several students who found their own internship positions indicated to the panel that they had difficulty finding a VU supervisor with expertise in their research topic, which sometimes caused friction during the supervision. The panel recommends that the programme management explores how students can be assisted in finding a matching VU-supervisor for their projects and clarifies what is expected from external and VU-supervisors.

Teaching staff

The teaching staff is roughly equally divided between the Faculty of Science and the AUMC. All the lecturers are active researchers in their teaching field. All the course coordinators and most of the lecturers have a PhD degree. All the course coordinators also have a University Teaching Qualification (UTQ) while several staff members also hold a Senior Teaching Qualification (STQ) or Leadership in Education qualification. Several courses include guest lecturers from other universities or the professional arena who discuss specific cutting-edge research fields or introduce a practical component.

Based on reviewed documents and discussions during the site visit, the panel concludes that the teaching staff members are suitably qualified to execute the programme. The panel also highlights the teaching staff's strong research profile, which it feels fits the programme's research focus. Sufficient attention is given to teacher professionalization and educational innovation. For example, the Study and Career trajectory's development was funded by a Comenius teaching fellowship awarded by the Netherlands Initiative for Education Research, and sufficient staff members are available to teach the programme. The teaching staff reported that they regularly discussed their teaching activities, formally in the annual lecturers' meeting and informally with colleagues.

Considerations

The MSc BMS curriculum has a clear structure with one specialization pursued each year, complemented by core course components. The panel is particularly impressed with the multidisciplinary integration course and the Study and Career trajectory that helps students reflect on their curriculum choices in relation to their ambitions. The strong research focus is reflected in the courses and the two research internships that constitute half of the curriculum. The biomedical disciplinary and societal specializations are coherent. However, the panel recommends investigating whether the integration between biomedical disciplinary and societal specializations could be improved so that they build upon each other and whether more common ground can be found in the curriculum. The programme is taught in English, which aligns with the research field's international orientation and the global labour market. Sufficient attention is given to English language proficiency among staff and students.

Students are well-supported and the curriculum is generally feasible. Most of the students graduate after two to three years. Even so, the panel thinks that there are opportunities for further improving the feasibility of the curriculum. It suggests for example investigating the literature thesis' place in the curriculum and providing appropriate prior knowledge required for the specialization courses to improve the feasibility. The panel advises to involve the students in optimizing the feasibility. Furthermore, the process of finding suitable internships and supervisors should be carefully monitored to prevent study delays in the competitive context of student internships. The programme has sufficient teaching staff who are suitably qualified and able to connect their teaching to state-of-the-art research.

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 system

Within the programme, assessment is based on the BETA faculty's assessment policy, which describes the vision for assessing the faculty, its organization and quality assurance mechanisms. The programme follows a programme assessment plan, which contains the programme and assessment visions. Furthermore, the examination process in each course is described in the programme assessment plan and the assessment strategy. The programme management updates the assessment plan annually via the PDCA cycle, based on the previous year's findings. The assessment plan provides an overview of the type of tuition and assessment applied in each part of the programme. Assessment methods vary between courses. The programme courses offer diverse and multiple assessments consisting of individual and group assignments, examinations comprising closed and open-ended questions, research proposals, review papers, laboratory reports, oral presentations and skills execution.

The panel learned from the information file that the assessment plan contains a clear matrix with information about how the different types of assessment align with the curriculum. Furthermore, the panel observed that the programme assessment plan is evaluated annually and appreciates this continuous monitoring. Moreover, the panel values the programme's use of uniform digital assessment forms, which the panel believes contributes to clarity and transparency in the assessment. These combined measures give the panel an impression of an efficient and solid assessment system that supports students by making assessments clear, transparent and accessible and aids teachers in making well-founded assessment decisions. In addition, the panel advises the examination board to continue monitoring alignment between the assessment matrix and the actual assessment plans of individual courses to make sure that intended learning outcomes mentioned in the assessment matrix are actually assessed within individual courses.

Thesis assessment

During the curriculum, students complete two research internships in each of their specializations. For students who choose two biomedical disciplinary specializations, both internship reports are considered to be the final product of the programme. This procedure guarantees that all students are assessed on the learning outcomes related to the BMS discipline. In line with the previous accreditation panel's

recommendation, the programme management monitors the biomedical nature of the societal specialization internships (Science in Society, Science Communication and International Public Health). If the internship does not include a biomedical component, the student is asked to adapt the internship proposal or find an alternative internship. The panel studied several final products and their assessment forms in preparation for the site visit. It found that the theses were assessed transparently, and the assessment provided students with insight into the various assessment elements by the underlying feedback. The panel also observed that both assessors graded the different components of the thesis comparably. Furthermore, the panel appreciates the soundly performed thesis assessment. In contribution to validity and reliability, students who delay their internship more than two months, need approval of the examination board for this. Above that, the panel values that there is one resit opportunity for the thesis report and/or the presentation.

Examination board

The master's programme is embedded in the HLS-EEE (Health and Life Sciences and Earth, Ecology and Environment) examination board, one of the two examination boards within the BETA faculty. The bachelor's and master's programmes in biomedical sciences have one combined sub-examination board. The examination board meets monthly to discuss student requests and fraud-related issues. The board is also responsible for the quality of course examinations and internships. The examination board monitors the quality of internship theses and their assessment yearly by examining a sample. The board establishes the course and thesis examiner requirements, appoints examiners, and verifies that they meet these requirements each academic year. In addition to the examination board's quality control of assessment within the programme, a faculty assessment committee evaluates the assessment dossier of courses within the curriculum and reports its findings to the programme management and the examination board. The programme management and examining board work closely together to ensure the quality of the assessment cycle. The examination board's responsibilities are described in the programme assessment plan and Assessment Programme M Biomedical Sciences and align with the BETA Assessment Policy and BETA Rules and Guidelines. Course evaluations of the Science Communication and Science in Society specializations are conducted by the MSc programme Management Policy Analysis and Entrepreneurship in the Health and Life Sciences programme committee, which organizes the education for these specializations. Furthermore, the sub-examination board biomedical sciences handles quality assurance of these specializations, with Athena being represented in the sub-examination board.

The panel spoke to members of the examination board and found that it is a solidly functioning board that understands its tasks and responsibilities and is accountable for them. Conversation with students and the student chapter revealed that students are aware of the examination board. However, communication about what to expect of the board could be improved. In several cases, students had to wait a long time before receiving a response from the examination board. In other cases, students were unsure which matters should be brought to the examination board's attention. The panel suggests that the examination board clearly communicates to students what they can expect of the board and the timeline for a response.

Considerations

The panel is satisfied with the master's programme's clear and transparent assessment policy and practice and found it an efficient and firm assessment procedure that supports students by making assessments clear, transparent and accessible and aids teachers in making well-founded assessment decisions. The panel studied the master's thesis assessment procedure and concluded that it is transparent and robust. The programme has a solidly functioning examination board that understands its tasks and responsibilities and is accountable for them. The panel advises the examination board to continue monitoring alignment between the assessment matrix and the actual assessment plans of individual courses.

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

Thesis quality

As part of its preparation for the site visit, the panel studied the final products of 15 students distributed over the seven specializations. The selection included six students who chose biomedical disciplinary specializations and nine students who combined a research and societal specialization. The panel concludes that the internship reports are of an appropriate and sometimes high level and demonstrate that students achieve the general and specialization-specific learning outcomes.

Alumni

Graduates of the MSc BMS take up various positions in research, policy and management. In an overview shared with the panel, the programme management indicated that most students from the 2017–2022 cohorts found research positions in hospitals, universities and research institutes (53%), industry and business (14%), health care (11%) and education (5%). The panel concludes that the alumni's positions demonstrate an appropriate exit level of students into research and society. It believes that the programme could benefit from attaching its alumni more strongly to the programme by asking them to contribute to the Study and Career trajectory as role models (see Standard 2). Several mechanisms that are currently in place, such as symposia and a LinkedIn group, could be used more proactively.

Considerations

The panel finds that the master's theses and alumni employment prospects demonstrate that the programme's learning outcomes are achieved by students in all specializations. Students find relevant positions in (medical) research institutes, industry and societal organizations.

Conclusion

The panel concludes that the programme meets Standard 4.

General conclusion

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

Development points

1. With the envisioned reflection on the programme's aims in mind, emphasize the MSc's unique feature of students pursuing two specializations rather than one, making the added value of specific combinations of specializations more than the sum of its parts. The programme management could investigate whether more common ground can be found in the curriculum, creating more opportunities for specializations to build upon each other. Make the added value of a combination of a biomedical disciplinary specialization combined with a societal specialization more explicit, and investigate whether this could be strengthened and highlighted even more as part of the programme's profile..
2. Investigate the literature thesis' place in the curriculum and the prior knowledge required for the specialization courses to improve the curriculum's feasibility.
3. Monitor alignment between the assessment matrix and the actual assessment plans of individual courses.
4. Carefully follow study progress and success at the individual student level and, among others, monitor the process of finding suitable internships and supervisors to prevent study delays in the competitive context of student internships.

Appendix 1. Intended learning outcomes

Dublin descriptor 1: Knowledge and understanding
<i>The graduate has theoretical and practical knowledge of Biomedical Science, in particular within the field of his/her specialization</i>
The graduate:
<ol style="list-style-type: none">masters the fundamental concepts of modern biomedical sciences and understands the state of the art in terms of developing theories and insight into the most important current research issues in the biomedical discipline in which the student has specialized.appreciates the place of his/her specialization within the biomedical and the natural sciences.is able to appreciate the scientific and social relevance of biomedical sciences, and of current research in the area of specialization.is able to think in multidisciplinary terms, and possesses an understanding of other disciplines (and sub-disciplines) that are of importance to biomedical sciences.has command of advanced research techniques, laboratory procedures and (statistical) methodology necessary for the specialization.
Dublin descriptor 2: Applying knowledge and understanding
<i>The graduate is experienced in carrying out research, in applying techniques specific to the subject area and in applying scientific knowledge to problems raised in society.</i>
The graduate:
<ol style="list-style-type: none">is able to design experiments in the different fields associated with Biomedical Sciences notably within the field of his/her specialization and analyze their results.has knowledge about the methodology used within research of the field of his/her discipline and can apply independently these methods in research.is able to apply his/her scientific knowledge to social questions.can think multidisciplinary and has insight in the relevant (sub)disciplines that are important to his/ her specialization.is able to reflect on the ethical aspects of research or its uses, and include these deliberations in the decision-making process.adopts an attitude towards the correct and unbiased use and presentation of data.
Dublin descriptor 3: Making judgements
<i>The graduate is able to independently and critically judge information.</i>
The graduate:
<ol style="list-style-type: none">is able to independently acquire information in the field of his/ her specialization, and to analyze and critically evaluate such information.is able to select and order information, to distinguish essentials from trivialities, and to recognize connections.is able to independently and critically analyze research in the field of his/ her specialization, both in relation to its design, planning and execution, and to the results obtained.has the ability to evaluate his/her own performance, both introspectively and in discussion with others.
Dublin descriptor 4: Communication
<i>The graduate is able to transfer knowledge and skills related to his/her subject area to other people and to adequately reply to questions and problems posed within society.</i>
The graduate:
<ol style="list-style-type: none">can report orally on research results in English with support of modern presentation techniques.can report in written form on research results on the level of peer-reviewed academic journals.can make essential contributions to scientific discussions about plans, results and consequences of research.can collaborate with researchers from other disciplines.
Dublin descriptor 5: Learning skills
<i>The graduate has developed learning skills that enable him/her to continue with self-education and development within the subject area.</i>
The graduate:
<ol style="list-style-type: none">is able to understand and summarize scientific literature within the field of his/ her specialization.is able to draw up a research plan, giving details of experimental design, execution and analysis.

- c. is familiar with general scientific journals such as Nature and Science, and with journals in the area of his/ her specialization.
- d. is familiar with computer software that is relevant to the field.
- e. has been able to influence his/her personal learning process by the choice of courses.

2. Without prejudice to the provisions of paragraph 1, a graduate of the following track/specializations will have the following knowledge and understanding in the field of specialization:

- Immunology:

The Master's graduate with a specialization in Immunology has a broad understanding of immunological processes, ranging from the molecular and cellular interactions between host and pathogen to an integrative knowledge of the role of the immune system in various pathologies, such as cancer, infectious diseases and autoimmunity. The Master's graduate has specialized in one of the subjects within the field of immunology. He/she possesses knowledge of current theory and the key research questions in the field of immunology and has an understanding of the scientific and social relevance of this subject area.

- Infectious diseases:

The Master's graduate with a specialization in Infectious diseases has a broad understanding of the biology of pathogenic organisms and the interaction between pathogens and their hosts. The Master's graduate has the ability to conduct scientific research in the field of medical microbiology and to critically assess the results of microbial research. The Master's graduate has specialized in one of the subjects within the field of medical microbiology. He/she possesses knowledge of current theory and the key research questions in this field and has an understanding of the scientific and social relevance of this subject area.

- Neurobiology:

The Master's graduate with a specialization in Neurobiology has knowledge, insight and understanding of the state of the art in terms of developing theories and insight into the most important current research issues in the neurosciences. The Master's graduate has the ability to conduct scientific research in the field of neurobiological research and to critically assess the results. The Master's graduate has specialized in one of the subjects within the field of neurobiology. He/she possesses knowledge of the significance of neurobiology within the context of brain research and some of its clinical implications.

- International public health:

The Master's graduate with a specialization in International public health has a broad understanding of current and future challenges in international public health, their main causes, and applied and potential interventions. The Master's graduate has specialized knowledge of relevant concepts from various disciplines, including epidemiology, policy science, anthropology, management studies, biomedical sciences and health sciences. The Master's graduate has the ability to conduct scientific research in the field of international public health and to critically assess the results of international public health research. The Master's graduate has specialized in one of the subjects within the field of international public health. He/she possesses knowledge of current theory and the key research questions in this field and has an understanding of the scientific and social relevance of this subject area.

- **Communication specialization:**

Biomedical science is increasingly becoming an interdisciplinary research field in which biomedical scientists can no longer function effectively in isolation. Rather, they benefit from interaction with other scientists (such as those in the fields of molecular biology, neurobiology and immunobiology) and societal actors (such as doctors, patients and policymakers). Communication about science takes place between academic peers and between scientists and the general public. This makes the Communication specialization a complex and dynamic field of research and practice, for example on patient participation in health research, the use and effects of media metaphors and hype, and public understanding of emergent technologies. The Master's graduate with this specialization has a theoretical understanding of the complex problems that arise during such communication processes, and has developed the necessary skills to act professionally at this interface to enhance communication and the outcomes of communication between scientific actors and society.

- **Science in Society:**

The Master's graduate with a specialization Science in Society combines an academic approach with the skills and competences that will allow him or her to perform scientific research at the interface of the biomedical sciences and society. The specialization aims to develop strategies that contribute to an understanding of complex societal problems and strategies to solve complex societal problems through interdisciplinary research. In addition, the programme analyses the social, economic and ethical aspects of new developments in the biomedical sciences, so as to assess their implications for society. Master's graduates have the necessary skills to collaborate and communicate with researchers from various scientific disciplines (including but not limited to those in the life sciences) and societal actors, and the ability to use these academic insights.

Appendix 2. Programme curriculum

Table 3: The M Biomedical Sciences programme structure Component 22-23

	Course	Year	Period	Credits
Compulsory courses	Integrated Biomedical Sciences	1	1	6
	Ethics in Life Sciences	1	3	3
	Scientific Writing in English	1	4-5-6	3
	Study and Career	1+2	1-6	3
Internship year 1	Internship Immunology-Infectious Diseases-Neurobiology	1	4-5-6	30
Literature Thesis		2	open	9
Internship year 2	Internship all specialisations	2	4-5-6	30
<i>Specialisations</i>				
Immunology	Advanced Molecular Immunology (compulsory)	1 or 2	1	6
	Clinical Immunology (compulsory)	1 or 2	2	6
	Immunotherapy and Immune Monitoring	1 or 2	1	6
	Molecular Infection Biology	1 or 2	2	6
	Immunometabolism	1 or 2	2	6
Infectious Diseases	Advanced Molecular Immunology (compulsory)	1 or 2	1	6
	Molecular Infection Biology (compulsory)	1 or 2	2	6
	Containment Strategies for Infectious Diseases	1 or 2	1	6
	Parasitology	1 or 2	2	6
	The Human Microbiome in Health and Disease	1 or 2	3	3
Neurobiology	From Molecule to Mind (compulsory)	1 or 2	1	6
	Clinical Neurosciences (compulsory)	1 or 2	2	6
	Genetics in Neurosciences (compulsory)	1 or 2	2	6
	Statistics in Neurosciences	1 or 2	1	6
International Public Health	Research methods for HS (compulsory)	2	1	6
	Containment Strategies for Infectious Diseases (compulsory)	2	1	6
	Policy Management and Organisation (compulsory)	2	2	6
	International Analysis of Health Care Systems	2	2	6
	Health Globalisation and Human Rights	2	2	6
	Disability and Development	2	3	6
Science Communication	Research Methods for Analyzing Complex Problems (compulsory)	2	1	6
	Science Communication (compulsory)	2	1	6
	Science Museology	2	2	6
	Science Journalism	2	2	6
	Communication, Organization and Management	2	2	6
	Science in Dialogue	2	3	6
Science in Society	Research Methods for Analyzing Complex Problems (compulsory)	2	1	6
	Analysis of Governmental Policy (compulsory)	2	1	6
	Communication, Organization and Management (compulsory)	2	2	6
	Management of Innovative Technologies in Community Based Health Care	2	2	6
	Health, Globalisation and Human Rights	2	2	6
	Business Management	2	2	6
	Policy, Politics and Participation	2	2	6
	Disability and Development	2	3	6
	Science in Dialogue	2	3	6
	Clinical Development and Clinical Trials	2	3	3
Education	Programme owned by lerarenopleiding VU	2	1-6	60

Appendix 3. Programme of the site visit

Concept bezoekprogramma VU

Locatie: Gebouw MF, Van der Boechorststraat 7, Amsterdam (Atrium, 1ste verdieping)

Di 3 okt

14.30	15.30	Intern overleg panel + inloopspreekuur
15.30	16.15	Gesprek met inhoudelijk verantwoordelijken M Oncology
16.15	17.00	Gesprek met studenten en alumni M Oncology
17.00	18.00	Themagesprekken M Oncology

Locatie: Gebouw MF, Van der Boechorststraat 7, Amsterdam (Atrium, 1ste verdieping)

Wo 4 okt

08.45	09.00	Aankomst
09.00	09.30	Examencommissie M Oncology
09.30	10.00	Intern overleg panel
10.00	10.30	Eindgesprek formeel verantwoordelijken M Oncology
10.30	11.00	Intern overleg panel
11.00	11.45	Gesprek met inhoudelijk verantwoordelijken B BMS
11.45	12.30	Gesprek met studenten en alumni B BMS
12.30	13.30	Lunch + intern overleg panel
13.30	14.30	Themagesprekken B BMS
14.30	15.00	Gesprek Examencommissies Bèta
15.00	15.30	Intern overleg panel
15.30	16.00	Eindgesprek formeel verantwoordelijken B BMS
16.00	16.30	Intern overleg panel
16.30	17.15	Gesprek met inhoudelijk verantwoordelijken B G&L
17.15	18.00	Gesprek met studenten en alumni B G&L

Locatie: Hoofdgebouw Forum 6 (1ste verdieping), De Boelelaan 1105, Amsterdam

Do 5 okt

08.45	09.00	Aankomst
09.00	10.00	Themagesprekken B G&L
10.00	10.30	Intern overleg panel
10.30	11.00	Eindgesprek formeel verantwoordelijken B G&L
11.00	11.30	Intern overleg panel
11.30	12.15	Gesprek met inhoudelijk verantwoordelijken M BMS
12.15	13.00	Gesprek met studenten en alumni M BMS
13.00	14.00	Lunch + intern overleg panel
14.00	15.00	Themagesprekken M BMS
15.00	15.30	Intern overleg panel
15.30	16.00	Eindgesprek formeel verantwoordelijken M BMS
16.00	17.30	Intern overleg panel
17.30	18.00	Mondelinge terugkoppeling en afronding

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:

- Student chapter
- Report previous accreditation committee
- Exit qualifications
- Domain specific reference framework
- Schematic overview curriculum
- Overview learning pathways
- Study guide
- Selection procedure regulations
- Staff involved in the programmes
- Examples of course materials
- Assessment policy
- Recent reports Board of Examiners