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BSc Biomedical Sciences
Vrije Universiteit Amsterdam

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Project code P2217

Contents

Summary

Standard 1. Intended learning outcomes

The BSc Biomedical Sciences programme has a strong research profile and international character and aims to equip students with a solid scientific background in (research in) human biology in health and disease. After graduation, students can enrol in a wide range of master's programmes. The programme's learning outcomes are well-formulated, clearly demonstrate an academic bachelor's level and align with academic and professional expectations. The panel advises the programme management to develop a strategic vision of the programme's focus and align the curriculum with this future-proof vision anticipating emerging topics and expectations in the biomedical (professional) field, e.g. data science, sustainability, and planetary health.

Standard 2. Teaching-learning environment

The BSc BMS curriculum has a clear structure with a logical progression. The panel values the quality of education experienced by students and the curriculum's alignment with the learning outcomes. The panel advises increasing the visibility of the learning pathways to emphasize the curriculum's coherence for students. The teaching methods applied in the programme are appropriate. However, the panel advises the programme management to integrate them into an articulate educational vision. Next to that, the panel advises the programme management to formalize crucial aspects of the programme, and advocates formalizing rules, agreements, and procedures to provide clear communication to students and staff about what is expected of them within the programme.

Overall, students are supported and guided by the programme. However, the curriculum's feasibility is hindered by potential study delay due to difficulties in finding suitable positions for the compulsory research internship. The panel feels that the burden of responsibility for finding an internship is currently placed too highly on the students. On forehand, students were not informed and guided sufficiently and timely by the programme on ways to find an internship. Moreover, the current shortage of internships places students in a difficult position, and the resulting study delay or risk thereof places stress upon students. The panel recommends that the programme management reflect on the internship's position in the curriculum and ensure that the research internship's current arrangement is feasible in the context of the programme. On faculty level this can be supported by taking actions to reduce competition among various programmes within the faculty of which students complete an internship in the same research area and organizations. The programme should develop solid procedures to guarantee that all students are well-positioned to find an internship without undue study delay, including providing appropriate guidance and communication with students throughout the process and creating a safety net for students who struggle to find an internship in time. The panel advises the programme management to formulate a plan to place all students in the position to start their internship on time by providing timely information about and guidance towards the internship. The panel also advises the programme management to engage students in this process.

The teaching staff are suitably qualified to teach the programme and are highly appreciated by students. The junior lecturers are especially appreciated. The programme management also recognizes the significant value of this committed group. The panel advises the programme management to monitor career and development opportunities for junior lecturers, and their impact on continuity of education in the programme.

Standard 3. Student assessment

The panel is impressed with the bachelor's programme's clear and transparent assessment policy and practice and considers 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. Sufficient quality assurance mechanisms are in place to ensure that students individually achieve the course's learning outcomes. The panel recommends that the programme management and examination board continue to monitor the situation and ensure that group assessment promotes individual student learning. Furthermore, the panel discourages further expanding the use of multiple-choice examination questions instead of open questions and recommends to keep monitoring question quality, alignment and well-considered use. The panel examined the bachelor'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 the alignment between the assessment matrix and the actual assessment plans of the individual courses.

Standard 4. Achieved learning outcomes

The panel believes the quality of the programme theses and satisfaction of alumni clearly demonstrate that the learning outcomes are achieved. The theses have a solid format and are generally of good quality. The alumni move on easily to related master's programmes. The alumni look back on the programme with appreciation. One thing the alumni desired was more information about career prospects after graduation during the programme. The panel recognizes this and adds that the programme could involve alumni and other professionals from the field proactively in this endeavour.

Score table

The panel assesses the programme as follows:

B Biomedical Sciences	
Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	partially meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	Conditionally positive

Prof. Hans van Leeuwen
Chair

Jessica van Rossum MSc
Secretary

Date: 22 December 2023

Introduction

Procedure

Assessment

On 3-5 October 2023, the bachelor's programme Biomedical Sciences of the Vrije Universiteit Amsterdam (VU) 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, Free University 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. They took the diversity of final grades and examiners into account. 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 report 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 such 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 bachelor's programme Biomedical Sciences at the Vrije Universiteit 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;
- Prof. dr. Maud Huynen, assistant professor Planetary Health, Maastricht University;
- Emma van Wijk BSc, master student Biomedical Sciences, Radboud University – student member.

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:	B Biomedical Sciences
CROHO number:	56990
Level:	Bachelor
Orientation:	Academic
Number of credits:	180 EC
Specialisations or tracks:	-
Location:	Amsterdam
Educational minor:	Applicable
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 (2017). Several recommendations and their follow-up actions were discussed with the programme management during a 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 several 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 BSc 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). The BMS programme at the VU strives to equip students with a broad and solid scientific foundation in the biology of health and disease in humans, at all organizational levels from molecular to societal. It aims to teach students the human biomedical principles of health and disease, with a focus on scientific research to unravel the underlying biomedical mechanisms of disease and its treatment and cure. The focus lies on performing scientific research into the biomolecular origins of diseases, their courses and possible treatments schedules.

The programme has a strong orientation towards fundamental biomedical research and an international character. It focuses predominantly on preparing students for a position within biomedical research, in which international team science is key to advancing the discipline. Students who have obtained their bachelor's degree are qualified to enrol in various (research) master's programmes at the VU, for example, Biomedical Sciences, Biomolecular Sciences, Global Health and Management Policy Analysis, and Entrepreneurship in Health and Life Sciences, Oncology, Neurosciences and Cardiovascular Research, and comparable master's programmes at other universities.

The panel studied the profile and aims of the BSc BMS and discussed these with programme representatives. It concludes that the programme has a clear and strong research profile that aims to educate graduates through a broad orientation towards the biology of health and disease in humans at all levels from molecular to societal. The panel appreciates the fact that students can enrol in a wide range of master's programmes after graduation, offering them numerous possibilities. The panel advises the programme management to develop a strategic vision of the programme's focus to future-proof it. The panel understands that the programme management is working to improve the programme with input from a curriculum committee,

which has begun in the spring of 2023. Curriculum changes include incorporating data science, making optimal use of the international classroom and keeping the learning pathways relevant and future-proof.

The panel approves of the programme management's ambitions, but also advises embedding curriculum improvements in a strong programme vision. The programme has experienced challenging years with a large inflow of students. This situation is now stabilizing, and the panel sees this development as a suitable opportunity to (re)define the programme's focus and formulate a well-defined long-term vision for future years. Once the programme management has defined this overall vision, it can use this to distil concrete steps for curriculum improvement, which could include the abovementioned improvements if they support the programme's long-term vision.

Intended learning outcomes

The BSc BMS aims have been translated into a set of learning outcomes (Appendix 1) that have been formulated alongside the Dublin descriptors for academic bachelor's programmes and describe the general knowledge, skills and attitudes required of graduates. The panel studied the learning outcomes and concluded that they are appropriate for an academic bachelor'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. The programme management, together with related programmes, has installed a professional advisory board to ensure the learning outcomes remain aligned with the demands of the professional field. This board advises the programme management on the knowledge and skills required of graduates entering the professional arena and to keep the curriculum's content up to date. The panel appreciates that the programme management discusses the learning outcomes with the professional field regularly and uses these discussions to keep the programme up to date.

Considerations

The BSc Biomedical Sciences programme has a strong research profile and international character and aims to equip students with a solid scientific background in (research in) human biology in health and disease. After graduation, students can enrol in a wide range of master's programmes. The programme's learning outcomes are well-formulated, clearly demonstrate an academic bachelor's level and align with academic and professional expectations. The panel advises the programme management to develop a strategic vision of the programme's focus and align the curriculum with this future-proof vision anticipating emerging topics and expectations in the biomedical (professional) field, e.g. data science, sustainability, and planetary health.

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 bachelor's course is a three-year 180 EC programme comprising 108 EC compulsory courses, 48 EC elective courses and a 24 EC internship in the final semester (see the programme curriculum in Attachment 2). The first year focuses on the fundamental aspects of the molecular and cellular organizational level, including topics such as genetics, biochemistry and developmental biology. During the second year, this foundation knowledge is extended to clinically orientated topics and to the level of human populations and society. Examples include medical pharmacology, oncology, and biomedical sciences and society. Optional courses in all years of study allow students to pursue more molecular, human biological or societal themes. In the third year, students begin with a minor (30 EC) of their choice, followed by a research internship (24 EC). In their minor, students attend a coherent package of courses, allowing them to gain more in-depth knowledge and insights into fundamental and clinical biomedical research. Students can also gain knowledge outside their field of study by enrolling in courses that are part of, for example, the Health and Life Sciences or Health Sciences curricula, or pursue an education minor to obtain a second-degree teaching qualification. During the internship, students apply their knowledge, insights and skills in biomedical research in the professional research field within or outside the VU. Students conduct an experimental or data-analysis-orientated research project, in which they actively participate in a scientific research programme within VU, Amsterdam UMC or an external research group.

Four learning pathways are incorporated into the programme to offer the student learning goals and objectives over a longer period:

- The *Academic Skills* learning pathway focuses on academic ways of thinking and conducting scientific research. It is incorporated into all courses throughout the curriculum.
- The *Mathematical Skills* learning pathway teaches students mathematical skills to convert complex processes in biomedical research into mathematical models. It is included in courses such as Biochemistry, Cell Biology and Histology, Microbiology and Medical Biochemistry.
- The *Bioinformatic Skills* learning pathway focuses on analyzing and evaluating large biomedical datasets. It is implemented in a large number of courses throughout the curriculum.
- The *Study and Career* learning pathway provides students with study support and orientates them towards the professional environment.

Students are informed of the learning pathways included in each course within the curriculum in the study guide.

The programme includes different teaching methods, such as lectures, excursions, practical exercises, business projects, work groups and interactive teaching in small groups. During the first two years of the curriculum, junior lecturers play a central role in the programme as tutors and coaches. They also assist in numerous courses, especially the Study and Career course and the Academic Skills learning pathway, and contribute to innovating education.

The panel studied the programme curriculum and several course materials and talked to the programme management, lecturers and students. It concludes that the curriculum has a clear structure and is a suitable translation of the programme's learning outcomes. Students confirmed this finding in an interview. They are

pleased with the high quality of education and find the different curriculum elements suitably aligned. Students advised the panel that they find the courses challenging and stimulating. Moreover, the students perceive that the programme has a logical build-up. The courses are suitably distributed with a combination of challenging and more manageable modules. Furthermore, the first-year courses provide a sound foundation for learning more complex topics. The panel agrees with this observation and appreciates the well-structured curriculum and the option for students to enrol in electives during the programme, allowing them to choose courses that provide more in-depth experience of fundamental or clinical research or a broader perspective on society. One point of attention students mentioned in the documentation and interview is that they wished for more lab work and attention for practical skills. The panel agrees with this and suggests the programme to integrate this furthermore in the curriculum.

Furthermore, the panel appreciates that the four learning pathways (e.g. the Academic Skills learning pathway) and the focus on scientific research (i.e. the internship) contribute to the curriculum's alignment with the learning outcomes. The panel approves of the learning pathways within the curriculum, with a separate coordinator per learning pathway. Nevertheless, discussions with various programme representatives revealed room for improvement. The learning pathways could be made more visible throughout the programme, enabling students to see how each learning pathway contributes to the programme's learning objectives.

Furthermore, the panel advises the management to formalize crucial aspects of the programme. Much of the programme's content is executed well, but is informally arranged, making it vulnerable to policy changes or a modified approach by different individuals. For example, the programme has a student committee which provides good quality information and guidance to students and is highly appreciated by the programme management. However, the committee's effectiveness relies upon the input and goodwill of the students who organize it. No arrangements have been made to continue and formalize the student committee. Therefore, when the current student cohort graduates, the student committee could cease to exist. In this context, the panel stresses the importance of making this committee a formal part of the programme. The panel advocates formalizing rules, agreements and procedures to provide clear communication to students and staff about what is expected of them within the programme.

In line with this, the panel advises the programme management to tie the current teaching methods to a more articulate educational vision. The panel also advises the programme management to engage students and the examination board in this process. The teaching staff currently has a free rein regarding teaching methods. The panel learned from the programme management that the use of activating teaching methods is stimulated and that traditional lectures are given less, but that implementation of variety in teaching methods differs among lecturers. The panel recommends that the programme management defines the criteria for the teaching methods in consultation with the teaching staff. In addition, the programme management can decide whether to place certain teaching methods above others. In this way, the programme management can develop a common approach among teaching staff and a collaborative way of teaching according to state-of-the-art insights on didactics.

Feasibility and guidance
As part of the *numerus fixus* selection procedure, the BSc ensures that students enter the programme with the knowledge and skills necessary to complete the curriculum. The selection procedure is based on two criteria: (1) existing knowledge (accounting for 30%), measured by their previous education GPA, and (2) the ability and motivation to acquire new knowledge and insights (accounting for 70%). Online lectures and study material representative of the first semester of the bachelor's programme are provided to assess the second aspect. A student's ability is assessed using a selection test.

The number of enrolled students increased from 272 in 2019–2020 to 403 in 2020–2021 and 506 in 2021–2022. In addition, the dropout rate after the first year has been approximately 42% over the past five years. The increase in student numbers and high dropout rate after the first year is largely due to a relatively high number of students for whom the BMS bachelor's programme was not their initial choice. Students who missed selection for BSc Medicine frequently enrolled in the BMS as an alternative before reapplying for the medicine programme during the first year of the BMS programme. Consequently, student motivation decreased, negatively affecting the return rates. A *numerus fixus*, with a maximum of 300 students, was implemented in 2022–2023 to guarantee a high standard of teaching and learning. Consequently, the number of enrolled students decreased to 135 with a higher proportion of international students. Preliminary feedback from staff indicates that on average this smaller cohort appears to be more motivated and committed than the previous larger cohorts. The programme applies a BSA (binding study advice), which determines that a positive result of 42 EC must be achieved within the first year. The study efficiency of students who enrol in the second year and finish the programme nominally after three years is approximately 40%, and 65% after four years.

During the programme, guidance is offered to students to create a supportive learning environment. A tutor system, in which students are guided and coached by a junior lecturer, has been adopted to support students with the transition from secondary or other types of higher education to studying at university. In addition, the Study and Career course, which covers the first and second years, has been implemented to guide students. During their internship, students are guided by a VU supervisor. In the case of an external internship, a daily supervisor can be provided by the internship organization. The project, organization and supervisor must be approved by the VU supervisor, who checks that the organization can provide sufficient academic quality and daily supervision. In addition, a student advisor is available to provide support to students regarding study progression and guidance in the case of study delay or other study-related problems. The study advisor can also direct the student towards more specific counselling or guidance. Furthermore, meetings centred on specific themes are organized to guide students in making choices at key moments during the curriculum (e.g. BSA, choosing an internship or master programme).

The panel learned from documents and interviews with the programme management, teaching staff and students that the curriculum's feasibility and guidance within the programme are sound overall. The panel observes from the documents that the study success rate after three years is approximately 40%. Therefore, the panel discussed the programme's feasibility with management and students. The programme management mentioned that one of the reasons for the relatively low success rate is the programme's significant growth in the previous years. The percentage is expected to increase once the smaller *numerus fixus* group of students graduate, with more motivated students, fewer dropouts and greater opportunity for staff to provide high-quality education to a smaller cohort of students. The curriculum committee has also examined the issue, investigating whether shortcomings exist in courses or the curriculum's development, and concluded that this was not the case.

During the site visit, the panel spoke with various programme representatives about the research internship's feasibility. Students mentioned experiencing difficulty finding an internship placement. The Amsterdam region has a shortage of internships and a high number of students seeking a position, making it challenging for students to find an internship. Furthermore, VU-groups and outside organizations providing internship placements tend to prefer MSc students over BSc students. Moreover, the BSc BMS students are not the only students searching for an internship. For example, students of the BSc Gezondheid and Leven, MSc Biomedical Sciences and MSc Oncology can also complete an internship in the same research area and organizations. Students advised the panel that they felt they received insufficient guidance in finding an

internship. They experienced limited communication about the internship and did not feel sufficiently informed about it. For example, although a module on how to find an internship is available, it is not a regular part of the curriculum. Several students heard about this module by chance from other students or lecturers. Other students were not informed about the module and were unaware that they could take it in preparation for an internship.

The problems of finding an internship placement make it difficult for students to graduate in time since the internship is the final and a compulsory part of the curriculum. The panel heard several examples of students who could not graduate as soon as they would have liked because they could not find an internship in time. Searching for an internship could result in delays of several months, and students mentioned that they and their fellow students frequently experienced searching for an internship as a burden and led to study stress and impacted well-being. Since it is challenging to find an internship placement, students would like more guidance from the programme. They need timely information and communication from the programme about the internship (process) and guidance on how to find an internship. The panel agrees with this finding and sees a correlation with the fact that much of the programme is informally arranged. Also in the internship procedure formalizing rules, agreements and procedures and formulating a clear educational vision can help to provide optimal communication to students and staff about what is expected of them and when it is expected. Furthermore, the panel feels that the burden of finding an internship is currently placed too highly on the students and they have to arrange this for themselves lacking information and guidance from the programme on this. The current shortage of internships places students in a difficult position, with the resulting study delay or risk thereof placing stress on students.

The panel recommends that the programme management reflect on the internship's position in the curriculum and ensure the research internship's current arrangement is feasible in the context of the programme. The programme should develop solid procedures, including appropriate guidance and communication with students throughout the process, to guarantee that all students are well-positioned to find an internship without undue study delay. The panel suggests that the programme management formulate a plan that aims to place all students in a position to start their internship on time by providing timely information about and guidance towards the internship. As part of the process, the panel advises the programme management to engage students to find a suitable solution and create and maintain an open dialogue with students to improve the internship placement process.

In addition, on faculty level this can be supported by taking actions to reduce competition among various programmes within the faculty of which students have to complete an internship in the same research area and organizations. The programme management could also actively create internships for students, and therefore engage in conversation with departments to secure internship placements for BSc BMS students and create a safety net for students who cannot find a suitable position by providing several guaranteed positions in internal departments or with preferred partners.

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 research field's international orientation and the global labour market. English language proficiency (level C1) is one of the academic staff recruitment requirements. Students are satisfied with the fact that the programme is taught in English. More than half of the student population consists of international students. Foreign students entering the programme must meet English language proficiency requirements as part of their admission. Moreover, students take an English language test during the first period of the curriculum. If the student's score is low, they must take an English refresher course.

Teaching staff

The programme lecturers are staff members of departments in the VU and AUMC and junior lecturers. The education is provided by key researchers and hospital practitioners from both institutions to provide cross-talk between fundamental biomedical research and clinical practice. The lecturers are specialists in their professional fields and qualified teachers. Almost all of the course coordinators and most of the lecturers have a PhD. Most of the course coordinators also have a University Teaching Qualification (UTQ), with several staff members also holding a Senior Teaching Qualification (STQ).

Based on the reviewed documents and discussions during the site visit, the panel concludes that the teaching staff is qualified to execute the programme. Student course evaluations and the National Student Survey reveal that the students highly appreciate the teaching staff. Students mentioned that they especially value junior lecturers for their dedication and enthusiasm they bring to the courses. Furthermore, the panel learned during the interviews that teaching staff provided good quality education despite the high numbers of students and Covid-19 pandemic challenges in previous years and the associated workload, and it highly appreciates this. A concern of the programme management is the career prospects of junior lecturers since permanent contracts cannot be offered due to policy restrictions. Additionally, lack of career prospects pose the risk of junior teachers leaving before the end of their contract with possible negative impacts on teaching capacity. The programme management, students and staff recognize the significant value of this committed group and desire fitting career prospects for them. Therefore, junior lecturers are provided with courses to help them become professional educators (for example, obtaining a UTQ) and career path guidance. The panel agrees with this approach and encourages the programme management to monitor career and development opportunities for junior lecturers.

Considerations

The BSc BMS curriculum has a clear structure with a logical progression. The panel values the quality of education experienced by students and the curriculum's alignment with the learning outcomes. The panel advises increasing the visibility of the learning pathways to emphasize the curriculum's coherence for students. The teaching methods applied in the programme are appropriate. However, the panel advises the programme management to integrate them into an articulate educational vision. Next to that, the panel advises the programme management to formalize crucial aspects of the programme, and advocates formalizing rules, agreements, and procedures to provide clear communication to students and staff about what is expected of them within the programme.

Overall, students are supported and guided by the programme. However, the curriculum's feasibility is hindered by potential study delay due to difficulties in finding suitable positions for the compulsory research internship. The panel feels that the burden of responsibility for finding an internship is currently placed too highly on the students. On forehand, students were not informed and guided sufficiently and timely by the programme on ways to find an internship. Moreover, the current shortage of internships places students in a difficult position, and the resulting study delay or risk thereof places stress upon students. The panel recommends that the programme management reflect on the internship's position in the curriculum and ensure that the research internship's current arrangement is feasible in the context of the programme. On faculty level this can be supported by taking actions to reduce competition among various programmes within the faculty of which students complete an internship in the same research area and organizations. The programme should develop solid procedures to guarantee that all students are well-positioned to find an internship without undue study delay, including providing appropriate guidance and communication with students throughout the process and creating a safety net for students who struggle to find an internship in time. The panel advises the programme management to formulate a plan to place all students

in the position to start their internship on time by providing timely information about and guidance towards the internship. The panel also advises the programme management to engage students in this process.

The teaching staff are suitably qualified to teach the programme and are highly appreciated by students. The junior lecturers are especially appreciated. The programme management also recognizes the significant value of this committed group. The panel advises the programme management to monitor career and development opportunities for junior lecturers, and their impact on continuity of education in the programme.

Conclusion

The panel concludes that the programme partially 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. This policy describes the vision for assessing the faculty, its organization and quality assurance mechanisms. The programme uses a programme assessment plan that contains the assessment's vision. Furthermore, the examination method within 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 according to the previous years' findings. The programme assessment plan provides an overview of the type of tuition and assessment used for each part of the programme. Assessment methods vary between courses. The programme courses offer multiple diverse assessments, including individual and group assignments, examinations with closed and open-ended questions, research proposals, review papers, laboratory reports, oral presentations and skills execution.

The panel derived from the information file that the assessment plan contains a clear matrix advising how the different types of assessment align with the curriculum. Furthermore, the panel observed that the programme assessment plan is evaluated annually, and it values this continuous monitoring. Furthermore, the panel recognizes that the programme uses uniform digital assessment forms, which the panel feels contribute to clarity and transparency in the assessment. Students noted that most teachers were transparent about what to study before an exam. Within all courses, review or feedback sessions are organized after the examination to give students insight into their successes and mistakes. The programme management provides teachers with opportunities to professionalize their assessment skills via assessment courses offered by the VU Learn! Academy. Therefore, the panel has the 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.

From the information file and an interview with students, the panel observed that students complete a significant number of group assignments, in which their work is graded together. As a result, students complete assignments within a group and are graded as a whole on the end result. Students mentioned that group tasks are frequently allocated to cater to individual students' strengths. Consequently, students do not foster the habit of practising skills they need to develop and from which they can learn. A further issue is

the risk of free-riding. The panel discussed this with the programme management and asked how individual performance is assessed in group assignments. The programme management responded that they use peer assessment to highlight individual performance within group work. Furthermore, group work is typically accompanied by individual assessment to ensure that students cannot complete a course through free-riding. The panel approves of these quality assurance measures. It recommends that the programme management and examination board continue to monitor the situation and ensure that individual students are encouraged to fulfil different roles in group projects to promote student learning through group work.

In addition, the self-evaluation report revealed that the COVID-19 pandemic, when examinations were taken via online proctoring, and the upsurge in student numbers have led to an increase in multiple-choice questions at the expense of open-ended questions in examinations. Students commented that this creates a gap in the transition to a master's programme, which is largely assessed through open-ended questions. The programme management substantiated that given the wide range of assessment methods used in addition to multiple-choice examinations, they did not consider the quality of assessment to be affected. The panel agrees with this observation but stresses to monitor question quality and alignment, not further expanding the use of multiple-choice questions and limiting their use to courses where they can enhance the learning process or are at least comparable to open-ended questions.

Thesis assessment
The bachelor's thesis allows the student to demonstrate their insights, attitudes and knowledge gained during the programme. All aspects of the internship are documented in the Internship Replacement document. The bachelor's thesis is assessed by a qualified VU/AUMC-VUmc examiner who is certified with a UTQ and a PhD degree as a minimum. In the case of an external internship, a VU/AUMC examiner is appointed to assess the internship with the local supervisor. After four weeks, a go/no-go assessment determines whether the student can continue the internship. The internship is finalized following the VU/AUMC examiner's assessment of the student's practical skills, academic knowledge and professional attitude. The bachelor's thesis is assessed by the examiner and a second, independent, examiner who is also appointed by the examination committee. The marks given by both examiners are averaged to provide the final grade. Uniform digital assessment forms are used for the go/no-go procedure and the final assessment. If the final marks given by both examiners deviate by more than two points or the thesis has been graded insufficient, the examination committee appoints a third examiner. The marks given by all three examiners are averaged to provide the final grade. If one of the first two examiners graded the thesis insufficient and the third examiner graded it sufficient, the three marks are averaged to provide the final grade with a minimum of 6.0.

As part of its preparation for the site visit, the panel examined 15 theses and their assessments. It concluded that overall the theses were assessed fairly, and the grades aligned with the panel's assessment. The panel approves of the programme's thesis assessment procedures due to their transparency and robustness. Since the previous re-accreditation in 2017, subgrades have been made visible, rubrics are available for students and feedback is given on forms as grade-underpinning. The assessment form gives clear guidelines for grading in relation to the rubric. The panel recognizes that the assessment is based on the substantial aspects of practical skills, professional attitude and academic knowledge. The panel considers using two independent assessors to promote a reliable and valid thesis assessment.

Examination Board
The bachelor'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. Furthermore, the board is responsible for the quality of course and internship examinations. The examination board monitors the quality of internship theses and thesis assessments by examining a sample of theses annually. The board appoints examiners by establishing the requirements for course and thesis examiners and verifying that the examiners meet the requirements yearly. In addition to the assessment quality control performed by the examination board 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 assessment plan and matrix B BMS and align with the BETA Assessment Policy and BETA Rules and Guidelines.

The panel spoke to members of the examination board and recognized a solidly functioning board that understands its tasks and responsibilities and is accountable for them. A point of attention the panel observed was the length of time students reported they had to wait before receiving an initial response from the examination board. Although the panel recognizes that it can take time for the examination board to formulate an answer, it recommends that the examination board submit a first response to students shortly after receiving a request with information about the subsequent steps. Furthermore, 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 factually assessed within individual courses.

Considerations

The panel is impressed with the bachelor's programme's clear and transparent assessment policy and practice and considers 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. Sufficient quality assurance mechanisms are in place to ensure that students individually achieve the course's learning outcomes. The panel recommends that the programme management and examination board continue to monitor the situation and ensure that group assessment promotes individual student learning. Furthermore, the panel discourages further expanding the use of multiple-choice examination questions instead of open questions and recommends to keep monitoring question quality, alignment and well-considered use. The panel examined the bachelor'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 the alignment between the assessment matrix and the actual assessment plans of the 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

In preparation for the site visit, the panel read 15 theses. It concluded that the theses demonstrate the level and quality expected of bachelor's theses in biomedical sciences. All the theses demonstrated appropriate use of academic literature and research methods, indicating that students were able to successfully formulate and investigate an academic research question. This resulted in sufficiently elaborate reports of the research students performed during their placement in a scientific project within a research department.

Alumni

During the site visit, the panel spoke with alumni from the bachelor's programme. They all indicated that they were satisfied with their education. From the student chapter, the panel learned that students felt confident in their ability to work in the field after completing their internship at the end of the programme. Most of the graduates enrolled in a master's programme, predominantly MSc Biomedical Sciences, MSc Management, Policy Analysis and Entrepreneurship in Health and Life Sciences, MSc Biomolecular Sciences or MSc Oncology.

The students and alumni the panel spoke with remarked that attention is given to career prospects after graduation during the programme. However, this could become a greater part of the programme. In the first and second years, students participate in the Study and Career workgroup, which includes a lecture with professionals from different fields. Students and alumni found this to be useful and desired more attention to be devoted to opportunities following graduation early in the programme. Doing so could help students consider their job prospects and options after graduation earlier so that they can choose suitable courses and pathways.

The panel recognizes that the alumni are satisfied with their education after graduation and the attention paid to career prospects during the programme. The panel agrees with students and alumni that this could be extended. The panel believes that the programme could benefit from its alumni by asking them to contribute to the Study and Career trajectory as role models so that students can learn from their career choices.

Considerations

The panel believes the quality of the programme theses and satisfaction of alumni clearly demonstrate that the learning outcomes are achieved. The theses have a solid format and are generally of good quality. The alumni move on easily to related master's programmes. The alumni look back on the programme with appreciation. One thing the alumni desired was more information about career prospects after graduation during the programme. The panel recognizes this and adds that the programme could involve alumni and other professionals from the field proactively in this endeavour.

Conclusion

The panel concludes that the programme meets Standard 4.

General conclusion

The panel concludes that the bachelor's programme in Biomedical Sciences meets Standards 1, 3 and 4 and partially meets Standard 2. Therefore, the programme's assessment is conditionally positive.

The panel imposes the following conditions:
Reduce the risk of study delay associated with difficulty finding research internships. This condition includes the following elements:

- Ensure the research internship's current set-up remains feasible in the context of the programme.
- Develop solid procedures to guarantee that all students are well-positioned to find an internship without undue study delay, including appropriate guidance for and communication with students throughout the process, and create a safety net for students who struggle to find an internship in time.
- Formalize rules, agreements and procedures to provide optimal communication to students and staff about what is expected of them and when it is expected.
- Engage with students and the faculty in an open dialogue throughout the improvement process.

Development points

1. Develop a long-term strategic vision of the programme's focus and align the curriculum with this future-proof vision.
2. Make communication from the programme management to students clearer to ensure students understand the direction of each part of the curriculum, including the learning pathways.
3. Formalize rules, agreements and procedures to provide clear communication to students and staff about what is expected of them within the programme
4. Increase the visibility of the learning pathways to emphasize the curriculum's coherence for students.
5. Think strategically about the teaching methods offered within the programme as part of the educational vision and develop this further.
6. Monitor career and development possibilities for junior lecturers.
7. Continually ensure students individually achieve the intended learning outcomes (especially in relation to group projects).
8. Involve alumni and other professionals in the field proactively in providing students with information about various career prospects.

Appendix 1. Intended learning outcomes

Exit qualifications
1. At all events, a graduate of the study programme will have knowledge and understanding in the field of:

A. Knowledge and understanding
The bachelor is able to:
• independently acquire multidisciplinary knowledge and understanding of biomedical health issues that are new to him or her;
• explain the biological basis of disease and health;
• describe the broad methodological basis of biomedical research.

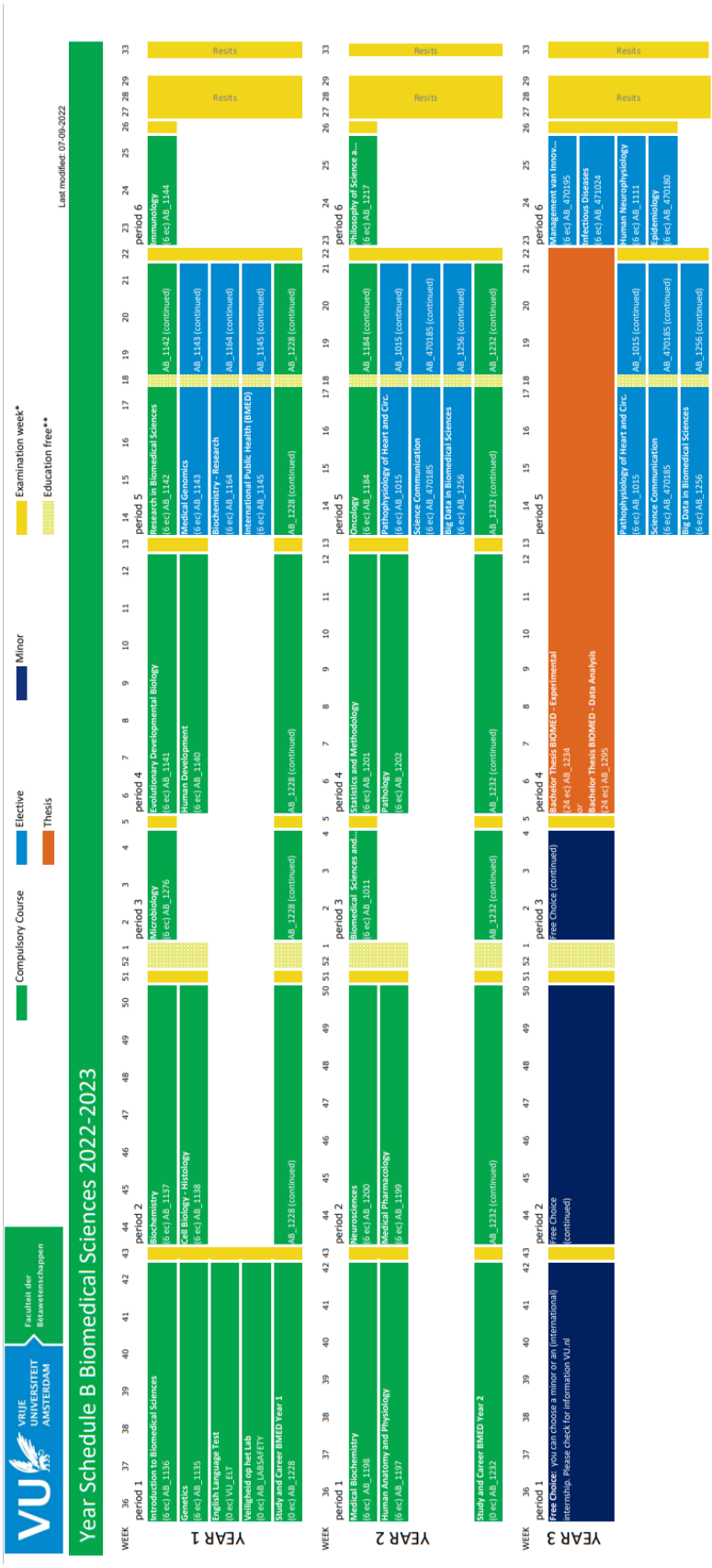
B. Applying knowledge and understanding
The bachelor is able to:
• define a specific biomedical question, formulate hypotheses and formulate interpretations;
• systematically collect and analyze qualitative and quantitative data;
• carry out biomedical research using the appropriate methods, techniques and statistical analyses;
• act on the basis of knowledge of regulations concerning scientific integrity;
• act and communicate in a respectful and responsible social and ethical manner in the field of science, employment relations and society.

C. Critical judgement
The bachelor is able to:
• select, understand and critically assess professional literature;
• assess whether biomedical laboratory techniques or research models are suitable and applicable for answering a research question or problem;
• assess the value of biomedical data collected and their applicability for answering a research question or problem definition;
• form an integer opinion on biomedical issues based on relevant clinical, scientific, ethical and societal aspects;
• think in a multidisciplinary manner on biomedical issues and establish links with related disciplines (e.g. Medicine and Biology).

D. Communication
The bachelor is able to:
• communicate verbally and in writing with colleagues, professionals and society;
• express a reasoned opinion orally and in writing.

E. Learning skills
The bachelor is able to:
• think critically;
• reflect on his/her own role and activities and then act accordingly;
• give and receive feedback and value it and act accordingly;
• set realistic goals, planning and working on a project basis;
• work constructively with (bio)medical professionals and students;
• choose a follow-up study and career that is appropriate to the possibilities and interests of the bachelor.

Appendix 2. Programme curriculum



* The examination weeks may differ. For more information about the annual format, click here and for the current timetable information go to roosters.vu.nl
** Education free means that no scheduled teaching or examinations take place on the VU campus. Exceptions may include: fieldwork, internship and research courses

Resits	P1	P2	P3	P4	P5	P6
Information Sciences	wk 2	wk 7&9	wk 14	wk 23	wk 27	wk 29/33
Natural Sciences and Mathematics	wk 2	wk 7&9	wk 14	wk 23	wk 27	wk 29/33
Health and Life Sciences	wk 2	wk 7&9	wk 14	wk 23	wk 27	wk 29/33
Earth, Ecological and Environmental Sciences	wk 2	wk 7&9	wk 14	wk 23	wk 27	wk 29/33

Appendix 3. Schedule of the site visit

Bezoekprogramma VU

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

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

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