



M Biomedical Sciences  
Radboud University

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## Summary

### Standard 1. Intended learning outcomes

The panel is positive about the profile of the programme, which focuses on the broad field of biomedical sciences ranging from molecule to man to population. The ILOs adequately reflect the profile and are clearly formulated. The ILOs are in line with the Dublin descriptors, excellently reflecting the master's level and academic orientation. The involvement of relevant stakeholders, including representatives from the field, enhances the support for these ILOs and ensures the relevance of the programme.

### Standard 2. Teaching-learning environment

According to the panel, the BMS programme has effectively translated its intended learning outcomes into an engaging curriculum. The curriculum strikes a balance, offering ample structure while allowing for a significant degree of flexibility. Consistent with the educational vision that emphasizes the creation of an environment where students are encouraged to apply knowledge and skills in authentic situations, students are required to complete at least two internships. However, a noteworthy concern is the brief duration of individual courses, posing a challenge in achieving substantial depth within the curriculum. In addition, the panel suggests that further enhancements could be made by extending the focus on data science within the curriculum.

The panel is very positive about the excellent support students receive throughout the programme. Specialization coordinators help students tailor the curriculum to their preference and act as a coach in case of problems or delays. According to the panel, the study load of the individual courses is reasonable, although students perceive that the first part of the programme is challenging, especially for international students. The panel appreciates the steps the programme undertakes in redesigning the first part of the curriculum.

The programme is taught by a motivated and highly approachable teaching staff with a diversity of biomedical expertise. The panel noted that the work pressure is very high. According to the panel, the programme management might improve the efficiency of the organization that currently has many assigned roles and functions.

### Standard 3. Student assessment

The panel is positive about several aspects of the programme's assessment system. The programme has a clear assessment policy based on the concepts of constructive alignment. Additionally, the comprehensive set of assessments addresses all the intended learning outcomes of the programme. Moreover, the panel considers the assessment formats used in the programme to be appropriate and diverse.

However, the panel expresses criticism regarding other aspects of the programme's assessment system. First, it notes the absence of a systematic quality assurance process for assessments, both in individual courses and master internships in the past years. There have been no annual samples testing the quality of the course assessments. The panel was informed that in study year 2023-2024 a start has been made with implementing a quality assurance procedure. This is appreciated by the panel, but the panel recommends to closely monitor the factual implementation in the coming years.

Second, the panel raises concerns about the significant weight (70%) assigned to the first assessor of the research projects in determining the final grade of internships. This becomes especially problematic in the case of external internships, compromising the overall quality assurance.

Third, the panel would like to see more consistency in the assessment process of the internships. It requests the programme to provide sharper guidelines to assessors. Special attention needs to be given to the evaluation of the final report of the consultancy internship, where, according to the panel, not all final projects align appropriately with the learning objectives. In addition, the panel urges ensuring that all assessment forms include sufficient feedback.

Fourth, considering the identified shortcomings in the safeguarding of the quality of the course assessments and the assessments of the final projects, the panel is of the opinion that the BoE could prioritize its tasks more effectively to better fulfill its legal responsibility as a guardian of the quality of assessments at this moment. The panel advises the BoE to include its findings on the quality of the exams and recommendations to the dean into the annual report. The panel is positive about the BoE's plans to systematically review the courses in the coming years.

#### Standard 4. Achieved learning outcomes

The panel concludes that graduates of the programme achieve the intended learning outcomes. The theses demonstrate that they have obtained a solid foundation in the necessary biomedical disciplines. The programmes prepare students for relevant positions in the academic and professional field.

#### Score table

The panel assesses the programme as follows:

Programme Master Biomedical Sciences	
Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	partially meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	conditionally positive
Prof. Dr. Hans van Leeuwen	Dr. Annemarie Venemans
Date: 13 February 2024	

# Introduction

## Procedure

### Assessment

On 11 and 12 December 2023, the master programme Biomedical Sciences of Radboud University was assessed by an independent peer review panel as part of the cluster assessment Biomedical Sciences. The assessment cluster consisted of 18 programmes, offered by Wageningen University & Research, Vrije Universiteit Amsterdam, University of Amsterdam, Leiden University, Radboud University, Maastricht University and Utrecht University. The assessment followed the procedure and standards of the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands (September 2018).

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

### Preparation

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

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

The programmes provided the secretary with a list of graduates over the period 2022 – 2023. In consultation with the secretary, the panel chair selected 15 theses per programme. They took the diversity of final grades and examiners into account, as well as the various tracks. Prior to the site visit, the programmes provided the panel with the theses and the accompanying assessment forms. They also provided the panel with the information file 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 information file and the theses, as well as the division of tasks during the site visit. The panel was also informed on the assessment frameworks, the working method and the planning of the site visits and reports.

### Site visit

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

### Report

The secretary wrote a draft report based on the panel's findings and submitted it to the coordinator for peer assessment. Subsequently, the secretary sent the report to the panel for feedback. After processing this

feedback, the 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 programme Biomedical Sciences at Radboud University.

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

The panel assessing the bachelor programme Biomedische Wetenschappen and the master programme Biomedical Sciences at Radboud University consisted of the following members:

- Prof. dr. Hans van Leeuwen, professor of Calcium and Bone Metabolism, Erasmus MC – chair;
- Dr. Annik van Keer, deputy head educational policy affairs, Faculty of Science, Utrecht University;
- Prof. dr. Frans Ramaekers, emeritus professor Molecular Cell Biology at Maastricht UMC and CSO and QA Manager at Nordic-MUbio;
- Dr. Leo Schouten, associate professor Cancer Epidemiology, Maastricht University;
- Daphne Louws BSc, master student Nutrition and Health, Wageningen University & Research – student member;

## Information on the programmes

Name of the institution:	Radboud University
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Biomedical Sciences
CROHO number:	66990
Level:	Master

Orientation:	Academic
Number of credits:	120 EC
Specializations or tracks:	Immunology and Host Defence, Clinical Human Movement Sciences, Epidemiology, Health Technology Assessment, Drug Safety and Toxicology, Molecular Medicine, Medical Neuroscience
Location:	Nijmegen
Mode(s) of study:	Fulltime
Language of instruction:	English
Submission date NVAO:	1 May 2024



## Description of the assessment

### Previous accreditation's panel's recommendations

The documentation included an overview of how the programme followed up on the recommendations given by the previous accreditation's panel (2018). Also, several recommendations and their follow-up actions were discussed with the programme during the site visit. The panel concludes that the recommendations have been seriously acted upon by the programme. The panel is generally content with the improvement measures taken and sees that these have contributed to improved quality of the programme. For some recommendations, the programme is still in the process of addressing these. These issues will be 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

#### *Aim and profile*

Biomedical sciences (BMS) comprise a broad field ranging from molecule to man to population, with the common aim to improve patient health and well-being. The aim of the BMS programme is to educate students to become biomedical professionals who are able to design, plan and conduct scientific research at the start of their careers, and who aspire to contribute to the translation of new biomedical knowledge into practice. The programme encompasses the entire spectrum of biomedical research, spanning from the molecular level to individual and population health. Students have the opportunity to specialize in seven distinct areas of expertise. The programme offers three career profiles: a research profile, a communication profile and a consultancy profile. The panel studied the aims and profile of the programme and concludes that the programme has a clear and relevant profile. According to the panel, the programme meets a clear demand from both academia, industry and governmental or societal organizations.

#### *Intended learning outcomes*

The programme uses a domain-specific framework of reference to relate the competencies of graduates to the expectations of the academic field. The programme has encapsulated its objectives in a set of six overarching Intended Learning Outcomes (ILOs), accompanied by specific outcomes tailored to each profile. The full set of ILOs is included in appendix 1. The panel studied the ILOs of the programme and concludes that they form a well-structured overview of the main goals of the programme translated into knowledge and skills to be acquired by students of the programme. According to the panel, the ILOs are well aligned with both the domain-specific framework of reference as well as the Dublin descriptors. The ILOs clearly reflect the appropriate level and academic orientation. The panel commends the programme for expanding on specific outcomes, giving due attention to the three distinct profiles.

With respect to the ILOs, the panel has two minor points of concern. First, the formulation of the objectives for the seven specializations could benefit from refinement. For example, the panel noticed that the specific learning objective related to the epidemiology specialization does not include any description of knowledge about research designs and methodology. Second, as the BMS programme prepares Dutch and international students for a highly international labour market, the panel recommends the programme to pay attention to cultural and international awareness in the ILOs.

#### *Academic and professional field*

To keep the programme aligned with the demands of the academic and professional field, the programme has installed an external Advisory Council. This Advisory Council provides overarching advice on the content and quality of both the bachelor's programme and master's programme in Biomedical Sciences, with a particular focus on the alignment with the professional field and the career prospects of graduates outside academia. Upon request, the Council offers advisory support to the educational management. Members of the Advisory Council are alumni of the programme who have attained prominent positions in society in the private or public sector outside academia. The panel notes that the programme is considering new ways to involve the professional field, such as the involvement of patients/patient organisations, public domain and companies/organisations linked to Radboudumc and beyond. The panel appreciates the progress that has been made in strengthening contacts with the professional field and applauds the programme with the further actions it plans to take in the near future.

### Considerations

The panel is positive about the profile of the programme, which focuses on the broad field of biomedical sciences ranging from molecule to man to population. The ILOs adequately reflect the profile and are clearly formulated. The ILOs are in line with the Dublin descriptors, excellently reflecting the master's level and academic orientation. The involvement of relevant stakeholders, including representatives from the field, enhances the support for these ILOs and ensures the relevance of the programme.

### 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

#### *Vision on learning*

The programme's vision on learning involves active engagement and constructive knowledge and skill building. The programme encourages students to take an active part in their own learning, to think for themselves and to reflect. The programme creates an environment where students are challenged to apply knowledge and skills in authentic situations and to work collaboratively on complex problems. The BMS programme is based on the principle of 'design your own programme', where students have a high degree of freedom to choose components and topics themselves. According to the panel, the programme's vision to learning is well reflected in the programme, as evidenced by the activating teaching methods and numerous options that students can choose from.

#### *Curriculum*

In line with the programme's educational vision, the BMS programme offers students a high degree of flexibility to create a tailor-made programme. The programme has been subdivided into seven specializations which the students can choose from.

The specializations on offer are:

1. Immunology and Host Defence
2. Clinical Human Movement Sciences
3. Epidemiology
4. Health Technology Assessment

5. Drug Safety and Toxicology
6. Molecular Medicine
7. Medical Neuroscience

Each specialization comprises a maximum of six core courses, each worth 3 EC, offered from September to December. Students follow two specialization courses in parallel. Specializations are designed to provide substantial structure and depth on specific core topics. First-year students are expected to enrol in all core courses within a specialization during the initial months of the academic year. While it is highly recommended to complete all courses within one specialization, it is not mandatory. In the second year, students have the option to take courses from one or more other specializations.

A recommendation of the previous review panel was to create learning pathways, which would improve the structure and depth of the curriculum. The panel believes that with the introduction of the seven specializations, the programme has succeeded well in providing a clear structure to the curriculum and for each chosen specialization it applies that the curriculum covers all intended learning outcomes. For each specialization, the programme has appointed a specialization coordinator who takes the lead in achieving alignment between courses per specialization. According to the panel, by introducing specializations, the programme has struck a balance of alignment between courses on the one hand and sufficient freedom of choice for students on the other. Students are very satisfied with the flexibility afforded to them to create a curriculum that is tailored to their preferences.

Due to the short duration of each specialization course, it remains challenging to achieve sufficient depth in the courses. Furthermore, the high workload and stress generated by the short course duration and number of exams (see also standard 3) are often cited by students as reasons for study delays. During the development dialogue, the panel and programme brainstormed about a revision of the start of the curriculum, involving a reduction in the number of specialization courses and allocating more time and attention to overarching and connecting components. The panel and the programme agree that these measures both improve the depth of the curriculum while reducing the workload of students. The panel is very positive about the programme's initiatives to further improve the initial part of the curriculum.

In addition to a specialization, a student chooses one of the three career profiles: research, consultancy, or communication. It is crucial to highlight that students opting for a communication or consultancy profile are still trained as researchers. Each of these profiles have several mandatory courses in the December – February period. Both the consultancy and communication profiles necessitate completion of four mandatory courses (of 3 EC each). Students opting for the research profile must enroll in a minimum of 6 EC worth of research profile courses.

The three career profiles are highly valued by students. It gives them the chance to focus clearly on future career opportunities. Students following the communication profile gain understanding of communication theory, exploring factors such as attitudes, social norms, and perceived control influencing intended behavior. They learn to apply this knowledge by creating, implementing, and assessing communication strategies tailored for specific target groups. The consultancy profile is designed to equip students for roles as scientific consultants. Here, students develop the skills necessary to provide valuable advice on issues within their expertise as scientific experts. Students in the research profile are gearing up for a career as researcher often laying the foundation for pursuing a PhD.

The previous review panel suggested to the programme to pay more attention to scientific integrity. In response to that, as from 2018-2019, all students participate in at least three Research Integrity Rounds (RIRs). These RIRs are interactive lectures and webinars covering a wide range of topics to promote dialogue and debate on issues of scientific integrity, open to all members of the academic community, spanning from students to PhD candidates and professors. For internships starting in 2023-2024, students will be required to complete an e-

learning course on the responsible use of data and the correct conduct of research. The panel acknowledges the increased attention placed on scientific integrity and data management within the curriculum. However, currently there are no credits assigned to the RIRs. To further emphasize the importance of this topic, it would be beneficial to allocate study EC to this programme component.

The programme includes consists of two internships, with one specifically designated as a research internship carrying a study load of at least 30 EC. The nature of the second internship is contingent upon the student's profile. For individuals with a research profile, both internships, totaling a minimum of 60 EC, will revolve around scientific research. Students in alternative profiles, in addition to their research internship of at least 30 EC, have the flexibility to select a second internship aligned with their chosen profile. Consequently, students pursuing a communication profile might engage in a project within the realm of health communication, while those in a consultancy profile could undertake a health policy analysis. Students may choose to extend their internships with more EC. It is also possible to perform an additional (third) internship.

Students are expected to arrange the internships themselves. It is up to the student to identify suitable workplaces, contact potential supervisors, and negotiate about the assignment. The internship is supervised by an internship supervisor, a senior scientist or postdoc. Once the internship project and supervisor are arranged, the student should prepare an internship plan. The student should discuss the internship plan with the supervisor and with the specialization coordinator (for research internships) or profile coordinator (for communication and consultancy internships). During the internship, regular meetings are arranged with the internship supervisor to discuss progress.

Students appreciate the incorporation of two extensive internships in the curriculum. This allows them to apply their knowledge comprehensively in practice. The panel appreciates the opportunities the programme provides for internships. According to the panel, the flexibility given to students in determining the content of their internships aligns excellently with the educational concept of the programme.

An area for improvement is the attention given to data science in the programme. While certain courses already cover aspects of bioinformatics and data science, the programme currently has no plans to expand its offerings in data science. This decision is attributed to the development of a new Medical Data Science master's programme within Radboudumc, in collaboration with the RU Science Faculty. The BMS programme aims to ensure that its students can take advantage of the offerings from this new master's program. However, the panel believes that the programme should not depend on courses from another programme but should retain control over the specific aspects of data science it imparts to its students. Consequently, the panel recommends enhancing the visibility of data science in the curriculum and improving alignment among courses in this field.

#### *Language*

The BMS programme is offered in English. For international recognition, the programme uses an English name. According to the programme, it prepares Dutch and international students for a highly international labour market (comprising a wide range of international and European organisations and institutions, multinational companies and international NGOs) where English is the working language. The programme believes that conducting classes in English not only facilitates an international classroom but also allowing the international staff to share their knowledge in depth. This gives students the opportunity to engage with a diverse array of researchers in an international context and encourages them to contribute to academic articles in international journals.

The panel considers the choice for the use of English to be well motivated. The work field at which graduates of the programme can be expected to work operates in an international environment. An English language programme prepares students for this internationally oriented field. Students are positive on the quality of the education in English.

The panel suggests that the programme could enhance its adherence to the international character of the programme. For example, the general communication concerning student activities organized by student organizations is mostly in Dutch and teachers as well as Dutch students sometimes use the Dutch language during teaching moments. The programme acknowledges this concern and has already implemented some measures, such as cultural awareness workshops. The panel encourages the programme to continue addressing this issue and to remain vigilant in maintaining an international focus.

#### *Feasibility and guidance*

As mentioned above, the master's programme starts with specialization courses. Within each specialization, the Specialization Coordinator (SC) takes responsibility for the coaching of students. They provide guidance and support to students throughout the programme. This guidance is personalized and tailored to the student's needs. The SC advises students on programme-related choices, discusses with them possible causes of problems or delays, and helps them improve their planning and results. During the master's programme, there are five compulsory individual meetings with the SC; more meetings are possible if requested by the student. In addition to a specialization, a student will structure his/her master by choosing one of the three career profiles: consultancy, communication and research. The specialization coordinators also act as the research profile coordinator. Students who choose the communication or consultancy profile interact with a specialisation coordinator (for their specialisation and the master's in general) and with the profile coordinator (for the part of the master which is related to the profile). Next to the coordinators, the study advisor is there for students in case of issues concerning planning or personal problems that affect study progress, or questions regarding admission to the programme or specific courses. The panel speaks highly of the extensive guidance that students receive during their education.

Of the BMS student cohorts that started the programme between 2015 and 2020, 34% graduates within 2 years, 77% within 3 years, and 85% within 4 years. The panel learnt during the site visit that the study load of the individual courses is reasonable. Students reported to the panel that they feel that especially the first part of the programme is challenging. It has an immediate fast pace, leaving little room for adaptation to a new study environment. This can be especially challenging for international students who must arrange a lot of practical living matters and to adjust to Dutch university life. The programme notes that an increasing number of students experience stress due to studies, performance pressure, and (the effects of) the corona crisis. In the student chapter, the students recommended changing the course periods to reduce the workload. The panel is pleased to see that the programme is making steps in redesigning the first part of the curriculum (as mentioned above) and appointed a second study advisor.

According to the panel, the programme places significant emphasis on career development. Collaboration with the faculty-wide Career Service has been strengthened, and an additional career officer has been appointed with a specific focus on BMS. The Career Service has established a LinkedIn page to disseminate information about career activities and to establish an alumni network. Furthermore, for the 2020 BMS lustrum, 48 alumni contributed profiles detailing their choices and career paths. These profiles were featured on the Radboudumc website, providing students with valuable insights into various future perspectives. Starting from the academic year 2022-23, a new annual BMS-specific event is organized with a focus on professional development and career perspectives. This event includes lectures, workshops, and networking sessions with speakers from both inside and outside academia.

#### *Staff and facilities*

The BMS programme's education is facilitated by a teaching staff with a wide range of biomedical expertise. The majority of BMS teachers hold a teaching qualification. According to the students, teachers have adequate didactic skills and are easily approachable. The panel concludes that the teaching staff is well-qualified for teaching in the programme, both in terms of research background and didactic qualities.

The panel observes an increase in workload among teachers. This is partly attributed to the growing number of students, which is approaching the limits of internship and course capacity. This is particularly evident in certain specializations such as Molecular Medicine, Immunology and Host Defense, and Neuroscience, as well as in terms of course capacity, specifically in the Consultancy profile. It can be challenging for staff to combine research with teaching activities. Moreover, due to escalating work pressures in the clinic and the fact that teaching is not always given top priority, the programme is finding it more and more challenging to engage clinicians and maintain their involvement in the programme. Additionally, the retirement of some active and experienced teachers is creating vacancies that will need to be filled.

Until now, prominent educators who play a leading role in the academic education at Radboudumc could be recognized as (Associate) Principal Lecturers (PL). The department of the PL receives a financial bonus for this. With the recent policy transition in Radboudumc from the appointment of principal lecturers to academic career paths, future prospects have become less clear for teachers. During the site visit, teachers expressed uncertainty and were concerned about the consequences of this transition on teacher's time and quality. The panel encourages the management to pay attention to communication on this topic and to provide clarity on the new policy as soon as possible.

The panel has noted that the above concerns have not resulted in a diminished quality of education. The panel appreciates the high level of motivation among the teachers and willingness to support each other when necessary. In addition, the programme will introduce a new specialization in Therapy Development and a new profile in Entrepreneurship to alleviate the workload in some of the existing specializations and profiles. The panel is positive about the work ethic of the staff but recommends the programme to continue monitoring the workload.

In the eyes of the panel another way to reduce the workload might be a simplification of the organizational structure. The previous visitation panel already noted that the educational organization is highly complex, with many assigned roles and responsibilities. Even though the specializations and profiles that have been introduced offer recognizable pathways with clear points of contact, the panel still observes a multitude of diverse roles and functions with the risk on indistinctness about responsibilities and mandates. The panel believes that this could be made more efficient, potentially positively impacting workload.

The panel considers teaching facilities (labs, classrooms etc.) adequate for current student numbers in the programme. However, one aspect that requires attention is communication with students. Information regarding study procedures is dispersed across various platforms, such as Brightspace, the RU website, and the study guide, creating confusion for students seeking specific information. The panel acknowledges the programme's ongoing efforts to improve the clarity of information.

### Considerations

According to the panel, the BMS programme has effectively translated its intended learning outcomes into an engaging curriculum. The curriculum strikes a balance, offering ample structure while allowing for a significant degree of flexibility. Consistent with the educational vision that emphasizes the creation of an environment where students are encouraged to apply knowledge and skills in authentic situations, students are required to complete at least two internships. However, a noteworthy concern is the brief duration of individual courses, posing a challenge in achieving substantial depth within the curriculum. In addition, the panel suggests that further enhancements could be made by extending the focus on data science within the curriculum.

The panel is very positive about the excellent support students receive throughout the programme. Specialization coordinators help students tailor the curriculum to their preference and act as a coach in case of problems or delays. According to the panel, the study load of the individual courses is reasonable, although students perceive that the first part of the programme is challenging, especially for international students. The panel appreciates the steps the programme undertakes in redesigning the first part of the curriculum.

The programme is taught by a motivated and highly approachable teaching staff with a diversity of biomedical expertise. The panel noted that the work pressure is very high. According to the panel, the programme management might improve the efficiency of the organization that currently has many assigned roles and functions.

### 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*

The programme has formulated an assessment policy that outlines principles for testing. The guiding principles for assessment are based on the concepts of constructive alignment, where learning objectives, teaching methods, and assessment are inherently interconnected. The programme maintains an annually updated assessment plan to guarantee the attainment of general learning outcomes within the compulsory components and profile-specific learning outcomes within the profile courses chosen by the student. The panel notes that the full range of assessments covers all the intended learning outcomes of the programme.

However, the panel notes that a systematic form of quality assurance for the assessments is in its infancy. During the site visit, the Board of Examiners (BoE) informed the panel that the quality of assessments of courses had not been evaluated up to 2022-2023. The previous accreditation panel recommended the programme to adopt the quality system used in the bachelor's BMS programme. In that programme, clusters of courses have their own assessment committees, chaired by an examiner with support from staff with expertise in assessment. Although the panel finds it positive that the programme recently has started to take annual samples of course assessments from 2023-2024, it recommends that the factual implementation of quality assurance for the assessments should be monitored over a longer period in order to assess its effectiveness.

The panel has observed that the programme employs a variety of assessment methods to assess knowledge and understanding, application of knowledge, judgement, communication, and learning skills. Assessment formats the programme uses are for example written (multiple-choice) exams, (written) assignments, (group) presentations, open-book exams, and reflection assignments. At least 50% of the final grade is determined by individual assessment. Since BMS courses are part-time during only four weeks, the master's Education Management Team (OMT3) recommends a maximum of one to two assessments per course. From 2022-2023, a rule was implemented that more than three assessments in one course are not allowed. This has helped in reducing the perceived workload among students to a more appropriate level. The students who spoke to the panel during the site visit still experience significant exam pressure due to having an average of three exams in four weeks. The panel is confident that a curriculum adjustment will reduce this exam pressure. Until then, it suggests the programme to critically assess the necessity of all exams.

#### *Master internships*

As mentioned under standard 2, students conduct two internships. The final assessment of the internships is based on the professional attitude and activities during the internship, judged by the internship supervisor (40%); written report, judged by the internship supervisor (20%); oral presentation, judged by the internship supervisor (10%); and a written report, judged by the second assessor (30%). Rubrics are being used in this assessment process. Students are highly recommended to arrange a midterm evaluation with their supervisors.

The programme designed a questionnaire for students to use in this evaluation. The panel is very appreciative of this midterm evaluation but advises the programme to make this procedure compulsory.

The panel examined a selection of internship reports (both general research internship and profile internship reports) of fifteen students with their corresponding assessment forms. The assessment of the final work is carried out using an assessment form on which a judgement is given on the various learning objectives. According to the panel, the quality of the narrative feedback on the form varies significantly. The panel examined assessment forms that included extensive feedback aimed at assisting students in their learning process. However, there were also assessment forms with minimal narrative feedback. The panel advises the programme to better ensure that assessment forms feature meaningful, narrative feedback that also provides insight into how the various assessment aspects contribute to the final grade.

Students wrote in the student chapter that the content and environment of internships can vary widely, leading to diverse experiences among students, both positive and negative. The panel believes that the guidance provided to assessors regarding the supervision and evaluation process is very general and non-committal. For instance, a suggestion is made regarding the number of feedback rounds in the thesis supervision, but this is optional. The same applies to the non-mandatory midterm evaluation as described above. According to the panel, this introduces the risk of an inequality in the assessment. The panel prefers to see more consistency in the evaluation process.

A significant number of the students undertake an internship outside the confines of RadboudUMC or Radboud University. These students have a first supervisor at their internship location, who also serves as the first assessor. Prior to the internship, the external supervisor receives guidelines for guidance. The second assessor evaluates the written report, just like the first assessor. If there is a difference of more than one point five between the two assessments, the report is submitted to a third assessor. The panel has noted that a significant portion of the final grade (70%) is determined by the external assessor. According to the panel, this compromises the quality assurance of external internships. Since the programme is responsible for the quality of external internships, the panel believes that the programme should better safeguard the quality. This could be achieved, for example, by assigning a greater role in assessment to an internal assessor or by maintaining better oversight of the quality of external assessors. Despite the recommendation from the previous accreditation panel to involve a second assessor in oral presentations which reduces the weight and influence of the external supervisor in the assessment, the programme has not yet adopted this suggestion. The current panel thinks that putting into effect this earlier advice would enhance the quality assurance of external internships.

One of the learning goals of the consultancy internship is that the student is able to communicate his/her advice in an advisory report that features a clear client focus and is well-structured, concise, persuasive, transparent, and grammatically and stylistically correct. The panel noted that the consultancy internship reports that it has studied were in most cases no advisory reports but PowerPoint presentations or an infographic. According to the panel, in this manner, the writing skills of the student cannot be adequately demonstrated. During the site visit, the programme management acknowledged that there has been too much focus on meeting the preferences of the consulting firm. From this academic year, the programme will therefore require students to write an academic consultancy report, regardless of the final product for the client, which will allow an independent judgement on the content and quality of the placement.

#### *Board of Examiners*

The Board of Examiners (BoE) Biomedical Sciences holds ultimate responsibility for ensuring the quality of assessments within the Bachelor's and master's programmes in BMS. The BoE consists of nine members, including an external member, and an administrative secretary. As outlined in the annual report, the primary task of the BoE BMS is to oversee the quality of the programme, particularly concerning the quality of assessments and individual graduation trajectories. Additionally, the BoE is responsible for making decisions



regarding admission to the master's programme for students with non-standard educational backgrounds or foreign qualifications. The committee also oversees and makes decisions about the issuance of diplomas. Lastly, the BoE mediates and makes decisions regarding the Education and Examination Regulations, as well as individual requests for deviations from these regulations. The conversation with the BoE during the accreditation visit made it evident that the committee engages in discussions with stakeholders of the programme, remaining well-informed about the ongoing developments within the educational institution.

According to the panel, the BoE could prioritize its tasks more effectively. The BoE has indicated a significant time commitment to the admission procedure for master's students. However, over the past years, limited time has been allocated to ensuring the quality of course assessments (as described above). In addition, the BoE mentioned during the accreditation visit that they did review samples of research projects but did not document the results, including improvement actions resulting from this evaluation. The panel believes that this means that the BoE lacks sufficient oversight of the quality of testing and assessment. Although the BoE recently started to systematically review the courses as part of a quality cycle in the coming years, the panel is of the opinion that the BoE is not adequately fulfilling its legal duty as a guarantor of test quality at this moment. The panel is positive about the intentions of the BoE to enhance the quality assurance of the courses. The panel encourages the programme management to provide the BoE with the best possible support in this endeavor.

### Considerations

The panel is positive about several aspects of the programme's assessment system. The programme has a clear assessment policy based on the concepts of constructive alignment. Additionally, the comprehensive set of assessments addresses all the intended learning outcomes of the programme. Moreover, the panel considers the assessment formats used in the programme to be appropriate and diverse.

However, the panel expresses criticism regarding other aspects of the programme's assessment system. First, it notes the absence of a systematic quality assurance process for assessments, both in individual courses and master internships in the past years. There have been no annual samples testing the quality of the course assessments. The panel was informed that in study year 2023-2024 a start has been made with implementing a quality assurance procedure. This is appreciated by the panel, but the panel recommends that the factual implementation should be monitored over a longer period in order to assess its effectiveness.

Second, the panel raises concerns about the significant weight (70%) assigned to the first assessor of the research projects in determining the final grade of internships. This becomes especially problematic in the case of external internships, compromising the overall quality assurance.

Third, the panel would like to see more consistency in the assessment process of the internships. It requests the programme to provide sharper guidelines to assessors. Special attention needs to be given to the evaluation of the final report of the consultancy internship, where, according to the panel, not all final projects align appropriately with the learning objectives. In addition, the panel urges ensuring that all assessment forms include sufficient feedback.

Fourth, considering the identified shortcomings in the safeguarding of the quality of the course assessments and the assessments of the final projects, the panel is of the opinion that the BoE could prioritize its tasks more effectively to better fulfill its legal responsibility as a guardian of the quality of assessments at this moment. The panel advises the BoE to include its findings on the quality of the exams and recommendations to the dean into the annual report. The panel is positive about the BoE's plans to systematically review the courses in the coming years.

### Conclusion

The panel concludes that the programme partially meets standard 3.

## Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

### Findings

#### *Thesis quality*

Prior to the site visit, the panel studied fifteen general research reports and fifteen profile reports. The panel took care that all tracks of the MSc programmes were sufficiently covered in the selection. Being the final elements of the programme and covering all learning outcomes, these products reflect the level achieved by students. The panel concludes that thesis quality is good. The topics cover relevant topics and make appropriate use of scientific literature and (quantitative) research methods in investigating the topics. Most theses were well structured and well written.

The panel considers the theses' quality to be in line with the grades given. The grading of the theses reflected the differences in the quality of the theses. According to the panel, the theses demonstrate that all students convincingly achieve the intended learning outcomes.

A minor point of attention concerns the sequence of the two final projects. Students are free to choose the order in which they undertake both internships. For students opting for the research profile, this means they undertake two research internships. From the final projects reviewed by the panel, it could not deduce in what order students conducted the internships. The panel recommends that the programme encourages students to formulate additional learning objectives for their second research internship to ensure an optimal learning curve.

#### *Alumni*

BMS graduates successfully secure positions in relevant roles within the biomedical field. According to the 2021 National Alumni Survey, a total of 32 recent BMS graduates awarded the programme an average rating of 4.03 out of 5. They reported significant development in four key competences during their studies: 'assessing the reliability of information,' 'analytical thinking,' 'independently acquiring new knowledge and/or skills,' and 'working effectively with others.'

Regarding their current status, 97% of participants indicated they were employed, 44% were pursuing a PhD, 50% were engaged in other forms of employment, and 6% were in a traineeship. On average, graduates secured their first job within three months of graduation. Among the respondents, 68% are employed in the health sector, with positions like Ph.D., junior researcher, and consultant being more prevalent.

### Considerations

The panel concludes that graduates of the programme achieve the intended learning outcomes. The theses demonstrate that they have obtained a solid foundation in the necessary biomedical disciplines. The programmes prepare students for relevant positions in the academic and professional field.

### Conclusion

The panel concludes that the programme meets standard 4.

## General conclusion

The panel's assessment of BMS is conditionally positive. According to the panel, the programme partially meets the basic quality on standard 3. The panel considers it realistic and achievable for the programme to meet the basic quality on this standard within two years, provided they implement certain improvements. Therefore, the panel recommends imposing the following conditions:

1. The Board of Examiners should take a more proactive role among others by establishing a quality assurance procedure for the assessments and monitoring its implementation to safeguard the quality of assessments of individual courses.
2. The programme should better safeguard the quality of assessment of the external internships.
3. The programme must mandate a written academic advisory report for the consultancy internship. The Board of Examiners should safeguard the quality of this end product.

## Development points

For further improvement of the programme, the panel makes the following recommendations:

1. Proceed with the revision of the initial phase of the curriculum by decreasing the number of specialization courses and allocating additional time and attention to overarching and connecting curriculum components.
2. Implement a simplification of the organizational structure with clearly assigned tasks and responsibilities in order to reduce the workload.
3. Provide sharper guidelines to thesis assessors, especially concerning the narrative feedback on thesis assessment forms that also need to provide insight into how the various assessment aspects contribute to the final grade.
4. Position the Board of Examiners more effectively by distributing priorities in a more balanced manner.

# Appendix 1. Intended learning outcomes

## General learning objectives

### The MSc:

1. combines broad fundamental knowledge on the mechanisms underlying health and disease processes in the full width of the biomedical sciences with specialistic knowledge on a specific field of expertise within the biomedical sciences<sup>1</sup> e.g., molecular life sciences, clinical neurosciences or population research;
2. gains in-depth, expert understanding of a (new or unfamiliar) biomedical topic on the basis of a literature thesis and describes the state of the art concerning a disease, mechanism or methodology;
3. explores the context of health(care) problems and translates fundamental knowledge into biomedical research that aims towards prevention, therapy, or diagnostics of disease;
4. conducts biomedical research independently, keeping up with international standards;
5. establishes him- or herself as a member of a professional network of scientists, including (a) the competence to participate in scientific discussions and present his/her work in the English language to an international scientific audience, (b) the capacity to write a scientific article at the level of international peer-reviewed journals;
6. integrates the societal and ethical impact of scientific research in relevant situations in his/her professional career.

The BMS master's has seven specialisations to choose from. Each specialisation contains a number of courses that reflect its central topics and methodology. Students also have the opportunity to participate in a wider selection of (elective) courses. The following specialisations are offered:

- Immunology and host defence

Students learn to understand the immune system and its interactions with pathogens or cancer cells, and develop therapies for immunological diseases.

- Clinical human movement sciences

Students explore different aspects of movement sciences with a clinical perspective, ranging from orthopaedic biomechanics to neural control and movement disorders.

- Epidemiology

Students study the distribution and determinants of health and disease conditions in human populations.

- Health Technology Assessment

Students learn to apply effectiveness research, create decision models for healthcare innovations and learn to measure health outcomes.

- Drug Safety and Toxicology

Students study the effect of toxic substances and adverse drug effects from molecule to man, to improve patient safety.

- Molecular Medicine

Students learn to translate fundamental knowledge on the molecular aspects of biomedical sciences into diagnostic, therapeutic and personalized treatment strategies.

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<sup>1</sup> The BMS master's has seven specialisations to choose from. Each specialisation contains a number of courses that reflect its central topics and methodology. Students also have the opportunity to participate in a wider selection of (elective) courses.

- Medical Neuroscience

Students learn to conduct research from basic to clinical and system-level neuroscience to provide better treatment options for brain-based disorders.

#### Research profile

##### The MSc

1. has state-of-the-art knowledge on advanced experimental and methodological approaches in the field of specialisation, providing the basis for developing and executing innovative research ideas;
2. achieves a profound professional level of the scientific competences formulated under 'general learning objectives' by conducting at least two research projects (internships). Has learned how to use past research experiences to further improve his/her own research skills;
3. Is proficient to move into an international PhD programme or to participate in research projects at healthcare institutions or e.g. pharmaceutical companies.

#### Communication profile

##### The MSc

1. understands mechanisms and processes that are involved in the perception and interpretation of scientific information by lay persons;
2. is able to design a communicative intervention on the basis of a thorough understanding of the target group;
3. is able to evaluate the effectiveness of communicative interventions.

#### Consultancy profile

##### The MSc

1. is able to effectively work with stakeholders in an advisory project to solve a policy problem, the solution of which requires biomedical expertise;
2. acquires the communicative skills to effectively manage human interaction in the context of policy making, including possible differences in stakeholder views, and associated resistance;
3. is able to write an advisory report that matches client needs and expectations.

## Appendix 2. Programme curriculum

Example of an individual BMS programme:

Year 1									
P1 (Sep)	P2 (Oct)	P3 (Nov)	P4 (Dec)	P5 (Jan)	P6 (Feb)	P7 (Mar)	P8 (Apr)	P9 (May)	P10 (Jun)
Spec.1 - 3 EC	Spec. 3 - 3 EC	Spec. 5 - 3 EC	BMS 1 - 3 EC	BMS 3 - 3 EC	Thinking critically about science - 3 EC	General Research Internship – 30 EC			
Spec. 2 - 3 EC	Spec. 4 - 3 EC	Spec. 6 - 3 EC	BMS 2 - 3 EC						
Scientific Integrity (1st and 2nd of 3 Radboud Integrity Rounds) – 0 EC									
Coaching: Master & Career Plan – 0 EC									

Year 2									
P1 (Sep)	P2 (Oct)	P3 (Nov)	P4 (Dec)	P5 (Jan)	P6 (Feb)	P7 (Mar)	P8 (Apr)	P9 (May)	P10 (Jun)
BMS 4 - 3 EC	BMS 6 - 3 EC	Literatur e thesis - 6 EC	Prof. 1 - 3 EC	Profile Internship – 36 EC					
BMS 5 - 3 EC	Elective - 3 EC		Prof. 2 - 3 EC						
Scientific Integrity (3rd of 3 Radboud Integrity Rounds) – 0 EC									
Coaching: Master & Career Plan – 0 EC									

Spec.	Course that is part of one of the seven BMS specialisations
Prof.	Course that is part of one of the three profiles: Research, Consultancy or Communication
BMS	BMS course that is not part of a specialisation or profile
Elective	Course that is not organised by the RU BMS programme

## Appendix 3. Programme of the site visit

### Day 1: 11 December 2023

11.00	11.15	<b>Welcome</b>
11.15	12.30	Meeting panel
12.30	13.30	<b>Interview programme management</b>
13.30	14.00	Meeting panel
14.00	14.45	<b>Interview BSc students</b>
14.45	15.30	<b>Interview BSc teachers</b>
15.30	16.00	Break
16.00	16.45	<b>Interview MSc students</b>
16.45	17.30	<b>Interview MSc teachers</b>

### Day 2: 12 December

09.00	09.30	Meeting panel
09.30	10.00	<b>Interview Board of Examiners</b>
10.00	10.30	Meeting panel
10.15	11.15	<b>Thematic session Ba</b>
11.15	12.15	<b>Thematic session Ma</b>
12.15	13.00	Lunch
13.00	13.30	Meeting panel
13.30	14.15	<b>Interview programme management</b>
14.15	16.00	Meeting panel
16.00	16.30	<b>Presentation</b>

## 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:

### General documents

- Reading Guide M Biomedical Sciences RU
- Administrative data (see Reading Guide, Introduction)
- Organogram Faculteit Medische Wetenschappen (FMW) (in Dutch)
- NVAO accreditation panel report and NVAO decision (2018)
- Response M BMS to previous panel recommendations accreditation 2018
- M BMS quality cycle overview
- Theme session master BMS

### Standard 1

- Domain-specific Reference Framework Biomedical Sciences (2016)
- BMS Advisory Council (in Dutch)
- NFU Sectorplan Medische en Gezondheidswetenschappen: Versnellen op gezondheid (2022, in Dutch)
- Radboudumc Sector plan Disease mechanisms and new therapies
- Intended Learning Outcomes BMS RU

### Standard 2

- Onderwijsvisie Radboud Universiteit – concept juni 2023
- Curriculum overview (see Reading Guide, Introduction)
- BMS course schedule 2023-2024
- Course Guide 2022-2023 and Course Guide 2023-2024
- Specialisations and Profiles in the BMS programme (version April 2023)
- Overview of teaching staff BMS
- Pre-master Biomedical Sciences
- BMS intake and outflow data
- Interpretation of time to graduate statistics
- Jaarverslag en notulen opleidingscommissie BMW
- BMS course evaluations
- National Student Survey (NSE)
- Programme Coaching and professional development – master Biomedical Sciences
- Project stagecapaciteit (2022)
- Scenario's capaciteit BMS opleiding (OMT-3, najaar 2021)
- Multi-annual workplan Language policy Radboud University 2018-2025
- Guidelines literature thesis BMS

### Standard 3

- Programme Assessment Overview M BMS 2023
- BMS Assessment Policy and Vision
- Education and Examination Regulations (EER):
- EER 2022-2023 and EER 2023-2024
- BMS course assessment matrices
- BMS assessment arrangements – Osiris data (Toetsregelingen)
- Selection course assessment files:



- BMS39 – \_Understanding proteins in 3D
- BMS61 – \_Statistical modelling in observational research
- BMS64 – \_Molecular and cellular toxicology
- BMS89 – \_Moving science – \_using film in science communication
- Jaarverslagen Examencommissie BMW 2021-2022; 2022-2023 (in Dutch)
- Regels en Richtlijnen Examencommissie BMW (29-11-2021) (in Dutch)
- Internship:
- Guide Internships - M Biomedical Sciences
- Internship supervisor guidelines and requirements
- Internship assessment forms

#### **Standard 4**

- Overview of internships of graduates 2022-2023 for selection of final works
- National Alumni Survey (NAE):
  - NAE 2021 Biomedical Sciences Open Questions
  - NAE 2021 Biomedical Sciences Tables
- Alumni profiles / BMS 35 years
- LinkedIn: Career Orientation BMS Radboudumc