Assessment report
Limited Framework Programme Assessment

Master Biomolecular Sciences

VU Amsterdam

Contents of the report

1. Executive summary

In this executive summary, the panel presents the main considerations which led to the assessment of the quality of the Master Biomolecular Sciences programme of VU Amsterdam, which has been assessed according to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, as published on 20 December 2016 (Staatscourant nr. 69458).

The panel considers the programme objectives to be sound. The panel regards the programme to have its own profile in the field of molecular cell biology and has established the programme to be well-embedded in research in this domain. The scientific level of the programme is definitely up to standard. The panel advises to be clear on the objectives in terms of preparing students either especially for research or for a broader range of professions.

The programme objectives are within the boundaries of the domain-specific reference framework for academic chemical sciences programmes. The panel appreciates the efforts by the joint programmes in chemical sciences in the Netherlands to draft this framework and regards this to be a sound and up-to-date description of this domain. The programme profile may be clearly distinguished within the framework.

The panel suggests to compare the programme to other programmes in the Netherlands and abroad, to delineate the profile of the programme more clearly.

The panel supports the programme objectives to prepare students for PhD positions and for research positions in the non-academic world.

The intended learning outcomes of the programme correspond to the programme objectives, are well-articulated and are conform to the master level.

The student inflow numbers of the programme are adequate. The panel considers the entry requirements to be relevant and the admission procedures to be appropriate. The panel proposes to inform prospective students more clearly about the programme objectives to prepare for PhD positions, if the programme chooses to do so.

The panel is positive about the contents of the curriculum. The curriculum meets the intended learning outcomes of the programme. The courses are up to standard, solid content-wise, evidently academic and clearly strongly related to research in this domain. The panel regards the coherence of the curriculum to be satisfactory.

The lecturers in the programme are both skilled and motivated. The educational capabilities of the lecturers are up to standard, as may be deduced from the proportion of BKO-certified lecturers. As the workload is challenging for lecturers, the panel advises to balance the workload by providing more support from the Faculty departments and VU central departments.

The educational concept and the study methods meet the programme characteristics. The number of hours of face-to-face education are adequate. The panel regards the student success rates to be satisfactory.

The examinations and assessment rules and regulations of the programme are in line with VU Amsterdam and Faculty of Science policies. The panel recommends to harmonise the rules and regulations of the two Examination Boards of the Faculty.

The examination methods adopted by the programme are consistent with the goals and the contents of the courses.

The supervision and assessment processes for the research placements projects are well-organised. Students are offered appropriate supervision. The assessment procedures are up to standard, involving two examiners assessing the work separately and on the basis of rubrics scoring forms. Although the oral feedback by examiners on the placement project results may be adequate, the panel suggests to provide more extensive written feedback.

The programme has taken adequate measures to ensure the validity, reliability and transparency of examinations and assessments.

The panel considers the course examinations to be up to standard.

The placement reports the panel studied, are appropriate scientific research projects and match the intended learning outcomes. The panel supports the grades given by the programme examiners. No reports were found by the panel to be unsatisfactory. The panel noted the reports being quite diverse in terms of contents and lay-out. The panel advises to harmonise these.

The panel considers the programme graduates to have reached the intended learning outcomes and to be qualified to either find PhD positions or non-academic research positions.

The panel that conducted the assessment of the Master Biomolecular Sciences programme of VU Amsterdam assesses this programme to meet the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, judging the programme to be satisfactory. Therefore, the panel advises NVAO to accredit the programme.

Rotterdam, 8 March 2019

Prof. dr. M.A. Cohen Stuart
(panel chair)

drs. W. Vercouteren
(panel secretary)

2. Assessment process

The evaluation agency Certiked VBI received the request by VU Amsterdam to manage the limited framework programme assessment process for the Master Biomolecular Sciences programme of this University. The objective of the programme assessment process was to assess whether the programme would conform to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, published on 20 December 2016 (Staatscourant nr. 69458).

Having conferred with management of the VU Amsterdam programme, Certiked invited candidate panel members to sit on the assessment panel. The panel members agreed to do so. The panel composition was as follows:

- Prof. dr. M.A. Cohen Stuart, professor emeritus, chair of Physical Chemistry & Colloid Chemistry, Wageningen University, professor emeritus of Physical Surface Chemistry, University of Twente, professor East China University of Science and Technology, Shanghai, China (panel chair);
- Prof. dr. A.H.T. Boyen, associate professor emeritus, Faculty of Sciences and Bio-engineering Sciences, Faculty of Medicine and Pharmacy, Vrije Universiteit Brussel (panel member);
- Prof. dr. R.M.J. Liskamp, professor, chair Chemical Biology and Medicinal Chemistry, School of Chemistry, University of Glasgow, United Kingdom, professor of Molecular Medicinal Chemistry, Utrecht University (panel member);
- Prof. dr. K. Augustyns, professor of Medicinal Chemistry, Dean Faculty of Pharmaceutical, Biomedical and Veterinary Sciences, University of Antwerp (panel member)
- Dr. M. Monshouwer, senior director and EU head Pharmacokinetics, Dynamics and Metabolism, Johnson & Johnson, Janssen Pharmaceuticals (panel member);
- A.E.M. Melcherts BSc, student Master in Nanomaterials Science, Utrecht University (student member).

On behalf of Certiked, drs. W. Vercouteren served as the process coordinator and secretary in the assessment process.

All panel members and the secretary confirmed in writing being impartial with regard to the programme to be assessed and observing the rules of confidentiality. Having obtained the authorisation by the University, Certiked requested the approval of NVAO of the proposed panel to conduct the assessment. NVAO have given their approval.

To prepare the assessment process, the process coordinator convened with management of the programme to discuss the outline of the self-assessment report, the subjects to be addressed in this report and the site visit schedule. In addition, the planning of the activities in preparation of the site visit were discussed. In the course of the process preparing for the site visit, programme management and the Certiked process coordinator regularly had contact to fine-tune the process. The activities prior to the site visit have been performed as planned. Programme management approved of the site visit schedule.

Well in advance of the site visit date, programme management sent the list of final projects of graduates of the programme of the most recent years. Acting on behalf of the assessment panel, the process coordinator selected the theses of 15 graduates from the last few years. The grade distribution in the selection was ensured to conform to the grade distribution in the list, sent by programme management.

The panel chair and the panel members were sent the self-assessment report of the programme, including appendices. In the self-assessment report, the student chapter was included. In addition, the expert panel members were forwarded a number of theses of the programme graduates, these theses being part of the selection made by the process coordinator.

Several weeks before the site visit date, the assessment panel chair and the process coordinator met to discuss the self-assessment report provided by programme management, the procedures regarding the assessment process and the site visit schedule. In this meeting, the profile of panel chairs of NVAO was discussed as well. The panel chair was informed about the competencies, listed in the profile. Documents pertaining to a number of these competencies were presented to the panel chair. The meeting between the panel chair and the process coordinator served as the briefing for panel chairs, as meant in the NVAO profile of panel chairs.

Prior to the date of the site visit, all panel members sent in their preliminary findings, based on the self-assessment report and the final projects studied, and a number of questions to be put to the programme representatives on the day of the site visit. The panel secretary summarised this information, compiling a list of questions, which served as a starting point for the discussions with the programme representatives during the site visit.

Shortly before the site visit date, the complete panel met to go over the preliminary findings concerning the quality of the programme. During this meeting, the preliminary findings of the panel members, including those about the theses were discussed. The procedures to be adopted during the site visit, including the questions to be put to the programme representatives on the basis of the list compiled, were discussed as well.

On 29 and 30 October 2018, the panel conducted the site visit on the VU Amsterdam campus. The site visit schedule was as planned. In a number of separate sessions, the panel was given the opportunity to meet with Faculty Board representatives, programme management, Examination Board members, lecturers and final projects examiners, and students and alumni.

In a closed session at the end of the site visit, the panel considered every one of the findings, weighed the considerations and arrived at conclusions with regard to the quality of the programme. At the end of the site visit, the panel chair presented a broad outline of the considerations and conclusions to programme representatives.

Clearly separated from the process of the programme assessment, assessment panel members and programme representatives met to conduct the development dialogue, with the objective to discuss future developments of the programme.

The assessment draft report was finalised by the secretary, having taken into account the findings and considerations of the panel. The draft report was sent to the panel members, who studied it and made a number of changes. Thereupon, the secretary edited the final report. This report was presented to programme management to be corrected for factual inaccuracies. Programme management were given two weeks to respond. Having been corrected for these factual inaccuracies, the Certiked bureau sent the report to the Board of VU Amsterdam, to accompany their request for re-accreditation of this programme.

3. Programme administrative information

Name programme in CROHO:	M Biomolecular Sciences
Orientation, level programme:	Academic Master
Grade:	MSc
Number of credits:	120 EC
Specialisations:	Molecular Cell Biology Biological Chemistry Molecular Bioinformatics (from 2018/2019 onwards)
Location:	Amsterdam
Mode of study:	Full-time (language of instruction English)
Registration in CROHO:	60616
Name of institution:	VU Amsterdam
Status of institution:	Government-funded University
Institution's quality assurance:	Approved

4. Findings, considerations and assessments per standard

4.1 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
The Master Biomolecular Sciences programme is offered by the Department of Molecular Cell Biology in cooperation with the Department of Chemistry & Pharmaceutical Sciences and the Department of Computer Sciences, all departments of the Faculty of Science of VU Amsterdam. The dean of the Faculty has the responsibility for all programmes of the Faculty. This Master programme is part of the Graduate School Human Health and Life Sciences of this Faculty. The programme director, assisted by the programme coordinator is responsible for the delivery and quality of the programme. The Programme Committee, being composed of four lecturers and four students, advises programme management on quality issues. The sub-committee of the Faculty Examination Board for this programme takes the responsibility to ensure the quality of examinations and assessments of the programme.

The Master Biomolecular Sciences programme is a two-year, research-based, multi-disciplinary academic master programme in the field of study of molecular interactions within the living cell. The programme is positioned at the interface of molecular biology, (bio)chemistry, and the physics of life, being rooted in the research done at the contributing, abovementioned departments of the Faculty of Science of VU Amsterdam. These departments together form the Amsterdam Institute of Molecules, Medicines and Systems. The objectives of the programme are to prepare students for scientific careers in the field of biomolecular sciences. To this end, students are educated in theoretical knowledge, research knowledge and skills, academic attitude and academic and practical skills in this domain.

The objectives of the programme are conform to the domain-specific reference framework for the chemical sciences in the Netherlands, which has been drafted by the joint programmes of this assessment cluster in the Netherlands. In this domain-specific framework, reference has been made to international frameworks and benchmark statements. This VU Amsterdam programme may be regarded to be positioned in the molecular life sciences sub-domain of chemical sciences.

Students may select one out of the three specialisations offered in the programme. The Molecular Cell Biology specialisation is geared toward the study of molecular processes within cells from the fundamental, molecular biological perspective. In the Biological Chemistry specialisation, the emphasis is put on the modulation and drug-ability of these processes. In the Molecular Bioinformatics specialisation, students are educated in the computer-based analysis of large molecular biological data sets.

The programme specifically aims to prepare students to conduct research in this field and to qualify both for PhD positions and for positions in research in non-academic organisations.

The programme objectives have been translated into intended learning outcomes, specifying knowledge and understanding of biomolecular sciences disciplines, such as biophysics, biochemistry, cell biology and molecular biology, research knowledge and skills of these disciplines and the combination thereof, knowledge of scientific literature, insight in current research, analysis and evaluation of research planning, execution and results, communication skills, collaboration skills, ethical awareness and self-evaluation.

The intended learning outcomes of the programme have been related to the Dublin descriptors for the master level.

Considerations
The panel considers the programme objectives to be sound. The panel regards the programme to have its own profile in the field of molecular cell biology and considers the programme to be well-embedded in research in this domain. The scientific level of the programme is up to standard and up-to-date. The panel advises to be clear on the objectives in terms of preparing students either especially for research or for a broader range of professions.

The programme objectives are within the boundaries of the domain-specific reference framework for academic chemical sciences programmes. The panel appreciates the efforts by the joint programmes in chemical sciences in the Netherlands to draft this framework and regards this to be a sound and up-to-date description of this domain. The programme profile may be clearly distinguished within the framework.

The panel suggests to compare the programme to other programmes in the Netherlands and abroad, to delineate the profile of the programme more clearly.

The panel supports the programme objectives to prepare students for PhD positions and for research positions in the non-academic world.

The intended learning outcomes of the programme correspond to the programme objectives, are articulated and are conform to the master level.

Assessment of this standard
These considerations have led the assessment panel to assess standard 1, Intended learning outcomes, to be satisfactory.

4.2 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
The influx of students decreased from 64 students in 2012 to 32 students in 2015 to rise again to 40 students in 2017. The programme management's inflow target is 50 students. The current distribution of students' backgrounds is about 60 % of the students having Dutch academic bachelor degrees, about 15 % of them coming from higher vocational institutes (hbo) and about 25 % of them originating from abroad. The students having Dutch academic bachelor degrees in biomedical sciences, biology, health and life sciences or related studies are admitted to the programme. For students with other backgrounds entry requirements have been specified. These include a minimum of 24 EC coursework in biochemistry or molecular cell biology at 300 level, the grade point average of 7 out of 10, minimum grade of 7.5 for the bachelor project, practical laboratory skills and academic attitude. The programme Admission Board evaluates prospective students on these criteria. Interviews with candidates are part of the admission procedures.

The curriculum of the programme takes two years, the total study load being 120.0 EC. Programme management presented a table, showing the mapping of the intended learning outcomes to the courses. The curriculum has been divided in the cursory part (60 EC) and the research placement or internship part (60 EC). The curriculum is composed of two compulsory courses (6 EC), to be taken by all students, compulsory and elective specialisation courses (30 EC), literature study (9 EC), elective courses (15 EC), and two research placements (60 EC in total and about 30 EC each). The compulsory or so-called portal courses introduce students to essential knowledge in this domain. In addition, obligatory courses on scientific writing and ethics are part of the curriculum. Academic skills are part of the other courses as well. The specialisation courses allow students to gain expert knowledge and skills in the specialisation field. These courses are quite close to the research done in these fields. In addition, optional practical courses are scheduled. The first research placement is to be done in the Amsterdam region. The second placement may be done at other places as well. The programme coordinator checks all placements to verify their meeting the quality requirements, set in the placement manual. Placements must be approved before they may start.

A total number of 25 lecturers are involved in the programme. The lecturers are researchers at one of the research groups of the Departments of Molecular Cell Biology, Chemistry & Pharmaceutical Sciences or Computer Sciences. These research groups are part of the Amsterdam Institute of Molecules, Medicines and Systems, which received scores excellent in the 2018 external research evaluation. All staff members have PhDs. Of the total number of lecturers about 88 % (22 out of 25) obtained the BKO-certificate. Quite some guest lecturers teach in courses. PhD students and postdocs are involved in the programme as teaching assistants and daily supervisors of Master projects. Lecturers are proficient in English. Lecturers experience the work load as very demanding, in particular regarding administrative matters, the support by the central VU department having diminished. Junior lecturers are recruited to alleviate lecturers' work load.

The educational concept of the programme is research-based education. The total number of hours of face-to-face education is on average 300 hours per year, leading to about 7.5 hours of face-to-face education per week. The number of face-to-face hours are about 12 hours per week in the cursory parts and about 4 hours per week during the research internships. The study methods adopted in the programme are lectures, discussions, workgroups, practical courses, and self-study. Educational innovation is being studied, but not yet implemented. Many courses are shared by students of this programme and students from related VU Faculty of Science programmes. Students consider the curriculum to be quite demanding, but the support infrastructure to be up to standard. Students may turn to lecturers and programme management for assistance. The student success rates for the last years are on average about 30 % after two years and somewhat over 60 % after three years.

Considerations
The student inflow numbers of the programme are adequate. The panel considers the entry requirements to be relevant and the admission procedures to be appropriate. The panel proposes to inform prospective students more clearly about the programme objectives to prepare for PhD positions, if the programme chooses to do so.

The panel is positive about the contents of the curriculum. The curriculum meets the intended learning outcomes of the programme. The courses are up to standard, solid content-wise, evidently academic and clearly strongly related to research in this domain. The panel regards the coherence of the curriculum to be satisfactory.

The panel regards the lecturers in the programme to be both skilled and motivated. The educational capabilities of the lecturers are up to standard, as may be deduced from the proportion of BKO-certified lecturers. As the workload is challenging for lecturers, the panel advises to balance the workload by providing more support from the Faculty departments and VU central departments.

The panel considers the educational concept and the study methods to be in line with the programme characteristics. The number of hours of face-to-face education are adequate. The panel regards the student success rates to be satisfactory.

Assessment of this standard
These considerations have led the assessment panel to assess standard 2, Teaching-learning environment, to be satisfactory.

4.3 Standard 3: Student assessment

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

Findings
The programme examination and assessment procedures are aligned with the VU Amsterdam and Faculty of Science policies on examinations and assessments. As has been indicated, the Examination Board for the programme has the authority to monitor the quality of examination and assessment processes and products. As the Faculty of Science is the outcome of the recent merger of two VU Faculties, there are still two Examination Boards in the Faculty. These boards are working to achieve one set of rules and regulations. The examination sub-committee for this programme specifically monitors the examinations and assessments quality.

The examination methods for the courses are selected in line with the courses' contents. The examination methods in the programme include written examinations, assignments, practical work, reports or essays and presentations. In each of the specialisations, all these examination methods have been adopted. General guidelines have been implemented to assess assignments, reports, essays and presentations.

The research placements are either internal internships at one of the research groups contributing to the programme or external internships. Students have to apply for placements themselves. The first placement is to be at VU Amsterdam or at institutes in the Amsterdam region. The second placement may be outside of Amsterdam and also abroad. Students are guided by the supervisor. PhD students or postdocs may be involved in the day-to-day supervision. In external placements, on-site supervisors may take part in the student guidance. At the go/no-go moment after six weeks in the process, the supervisor decides if students may proceed. Placement reports are assessed by the supervisor and the independent second reader separately, using rubrics scoring forms. External placements are assessed by VU examiners. The two grades are averaged. The assessment components include execution of the work, attitude, written report and oral presentation. To pass, all components have to be at least satisfactory. In case the assessments of the examiners differ more than 2.0 points or in case one of the examiners judges the project to be unsatisfactory, a third examiner determines the grade.

Programme management and the Examination Board have taken measures to promote the quality of examinations and assessments. The assessment plan for the programme lists the intended learning outcomes, the course goals and the relations between the two and specifies quality assurance measures. The Examination Board appoints examiners. Draft examinations are peer-reviewed on formal and material aspects. Examination matrices have been adopted. Examinations with deviant grade distributions and all multiple-choice examinations are analysed. Samples of examinations and samples of placement reports are reviewed on a regular basis by Examination Board representatives.

Considerations
The panel approves of the examinations and assessment rules and regulations of the programme, these being in line with VU Amsterdam and Faculty of Science policies. The panel recommends to harmonise the rules and regulations of the two Examination Boards of the Faculty.

The panel approves of the examination methods adopted by the programme. The methods are consistent with the goals and the contents of the courses.

The supervision and assessment processes for the research placements projects are well-organised. Students are offered appropriate supervision. The assessment procedures are up to standard, involving two examiners assessing the work separately and on the basis of rubrics scoring forms. Although the oral feedback by examiners on the placement project results may be adequate, the panel suggests to provide more extensive written feedback.

The panel considers the measures ensuring the validity, reliability and transparency of examinations and assessments to be adequate.

Assessment of this standard
The considerations have led the assessment panel to assess standard 3, Student assessment, to be satisfactory.

4.4 Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings
The panel studied the examinations of a number of courses of the programme.

The panel reviewed 15 placements reports of programme graduates of the last two years. The average grade for these Master projects was about 7.9 in the years 2015 to 2018. Internal placements were on average graded 7.6 and external placements were graded on average 8.0 in this period. The average grade for external placements may be seen as a sign of appreciation for the students of the programme by external institutes. Regularly, students are co-authors of peer-reviewed publications.

The career perspectives of graduates of the programme are good, as may be concluded from the survey among students graduated between 2015 and 2018. It takes programme graduates on average 3.4 months to find suitable positions. About 50 % of the graduates have secured positions as PhD students, whereas about 10 % is searching for such positions. About 24 % of the graduates are employed as researchers outside of academia or as research technicians. About 87 % of the graduates expressed being content with their current positions.

The programme is in the process of installing an external advisory board, to formalise the relations with the professional field.

Considerations
The panel considers the course examinations to be up to standard.

The placement reports the panel studied, are appropriate scientific research projects and match the intended learning outcomes. The panel supports the grades given by the programme examiners. No reports were found by the panel to be unsatisfactory. The panel noted the reports being quite diverse in terms of contents and lay-out. The panel advises to harmonise these.

The panel considers the programme graduates to have reached the intended learning outcomes and to be qualified to either find PhD positions or non-academic research positions.

Assessment of this standard
The considerations have led the assessment panel to assess standard 4, Achieved learning outcomes, to be satisfactory.

5. Overview of assessments

Standard	Assessment
Standard 1. Intended learning outcomes	satisfactory
Standard 2: Teaching-learning environment	satisfactory
Standard 3: Student assessment	satisfactory
Standard 4: Achieved learning outcomes	satisfactory
Programme	satisfactory

6. Recommendations

In this report, a number of recommendations by the panel have been listed. For the sake of clarity, these have been brought together below. These panel recommendations are the following.

- To be clear on the objectives in terms of preparing students either especially for research or for a broader range of professions.
- To compare the programme to other programmes in the Netherlands and abroad, in order to delineate the profile of the programme more clearly.
- To inform prospective students more clearly about the programme objectives to prepare them for PhD positions, if the programme chooses to do so.
- To balance the workload of the lecturers by providing more support from the Faculty and VU central departments.
- To harmonise the examination and assessment rules and regulations of the two Examination Boards of the Faculty.
- To provide more extensive written feedback on the Master project results.
- To harmonise the required contents and lay-out of master project theses.