

BIOLOGY
WAGENINGEN UNIVERSITY

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This report was finalised on 29 June 2020

REPORT ON THE BACHELOR'S AND THE MASTER'S PROGRAMME BIOLOGY OF WAGENINGEN UNIVERSITY

This report takes the NVAO's Assessment Framework for the Higher Education Accreditation System of the Netherlands for limited programme assessments as a starting point (September 2018).

ADMINISTRATIVE DATA REGARDING THE PROGRAMMES

Bachelor's programme Biology

Name of the programme:	Biologie (in English: Biology)
CROHO number:	56860
Level of the programme:	bachelor's
Orientation of the programme:	academic
Number of credits:	180 EC
Specializations or tracks:	Cell & Molecular Biology; Organismal Adaptation & Development; Human and Animal Health Biology; Ecology and Biodiversity
Location:	Wageningen
Mode of study:	full time
Language of instruction:	Dutch
Submission deadline NVAO:	01/05/2021

Master's programme Biology

Name of the programme:	Biology
CROHO number:	66860
Level of the programme:	master's
Orientation of the programme:	academic
Number of credits:	120 EC
Specializations or tracks:	Cell & Molecular Biology; Organismal Adaptation & Development; Human and Animal Health Biology; Ecology and Biodiversity
Location:	Wageningen
Mode of study:	full time
Language of instruction:	English
Submission deadline NVAO:	01/05/2022

The online visit of the assessment panel Biology to Wageningen University took place on 20 April 2020.

ADMINISTRATIVE DATA REGARDING THE INSTITUTION

Name of the institution:	Wageningen University
Status of the institution:	publicly funded institution
Result institutional quality assurance assessment:	positive

COMPOSITION OF THE ASSESSMENT PANEL

The NVAO has approved the composition of the panel on 3 March 2020. The panel that assessed the bachelor's and the master's programmes Biology consisted of:

- Prof. dr. S. (Stanley) Brul, full professor in Molecular Biology and Microbial Food Safety at the University of Amsterdam and chair of the Dutch Institute for Biology (NIBI) [chair];
- Prof. dr. F.G.M. (Frans) Kroese, full professor in Immunology at the University of Groningen;
- Ir. E. (Eric) Schouwenberg, head of the advisory group Nature & Biodiversity at Arcadis Nederland B.V.;
- Dr. A. (Annik) Van Keer, team leader of the undergraduate studies and higher education policy officer at the Faculty of Science of Utrecht University;
- BSc. J. (Jelle) Keijzer, alumnus of the bachelor's programme Biology, student board member of the Department of Biology and future master's student in Molecular and Cellular Life Sciences (September 2020) at Utrecht University [student member].

The panel was supported by dr. E (Els) Schröder, who acted as secretary.

WORKING METHOD OF THE ASSESSMENT PANEL

The site visit to the bachelor's programme and master's programme Biology at Wageningen University would have been part of the cluster assessment Biology in 2020 and 2021. Wageningen University expressed to quality assurance agency QANU a wish for a site visit to be arranged in a different way; more focused on the developmental approach of the visitation. It also envisioned an assessment in which the panel would mostly make use of existing programme documents, instead of a carefully written Self Evaluation Report. QANU project coordinator dr. Alexandra Paffen; drs. Bernadette Dijkstra, policy advisor at Wageningen University; ir. Marjolijn Coppens, programme director of the Biology programmes; and ir. Arno Hoetmer, study advisor Biology, discussed the new assessment set up at length.

An assessment panel for this development oriented assessment was composed of five panel members. Three panel members had extensive experience in programme assessment as well as experience with assessing other programmes of Wageningen University (panel members Brul, Kroese and Van Keer). The panel was completed with two new panel members (for 'fresh' eyes, panel members Schouwenberg and Keijzer). The site visit would take place on 20 April 2020.

Both the plan for the development oriented assessment and the composition of the assessment panel were submitted to the NVAO. Both were approved by the daily board of the NVAO.

Preparation

On 31 January 2020, the panel chair was briefed by QANU on his role. A preparatory panel meeting was organised on 10 March. During this meeting, the new panel members received instruction on the use of the assessment framework. The panel discussed their working method and the form and planning of the site visit and report.

However, soon after the preparatory meeting, it became clear that due to the COVID-19 virus all universities would be closed until further notice. The possibility for the assessment to take place online became apparent. The project coordinator not only submitted this idea to the NVAO, but also asked advice from amongst others Marije Sluiskes MSc. (ISO) and Marielle Klerks (quality assurance advisor and experienced assessment chair and secretary). On 30 March, it was decided by both panel and programme that the online assessment of both programmes would take place on 20 April, but only if the panel would conclude based on the study of existing documents that the programmes would receive a positive assessment. This was the case. The panel decided to postpone the development dialogue until an actual visit could take place. It is scheduled to take place on 9 July 2020 in Wageningen. A separate report for this interview will be published by WU.

The project coordinator composed a schedule for the online assessment in consultation with the programmes' director and study advisor. Prior to the assessment they selected representative partners for the various interviews. See Appendix 4 for the final schedule. Dr. E. (Els) Schröder acted as secretary in the online assessment. J. (Jaira) Azaria MA was present during the assessment as observer for future online assessments.

Before the online assessment, QANU received the programmes' documents, which were accompanied by an extensive reading guide and a short SWOT analyses (an overview of these materials can be found in Appendix 5). These were made available to the panel via an interactive panel platform. A thesis selection was made by the panel's chair and the project coordinator. The selection consisted of fifteen theses and their assessment forms for each of the programmes, based on a provided list of graduates between 2017 and 2019. A variety of topics, involved departments and a diversity of examiners were included in the selection. The project coordinator and panel chair assured that the distribution of grades in the selection matched the distribution of grades of all available theses. After studying the documents, the panel members formulated their preliminary findings. The secretary collected all initial questions and remarks and distributed these amongst all panel members.

At April 14 the panel discussed its initial findings on the documents and the theses, as well as the division of tasks during the online site visit.

Site visit

The online assessment of the bachelor's and master's programmes Biology of Wageningen University took place on 20 April. The panel conducted interviews with representatives of the programmes: students and staff members, the programme's management, alumni and representatives of the Board of Examiners. It also offered students and staff members an opportunity for confidential discussion during a consultation hour. One person requested a consultation.

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 panel's preliminary findings and general observations.

Report

After the online assessment, the secretary wrote a draft report based on the panel's findings and submitted it to the project coordinator for peer assessment. Subsequently, the secretary sent the report to the panel. After processing the panel members' feedback, the project coordinator sent the draft report to programmes' director in order to have it checked for factual irregularities. The project coordinator discussed the ensuing comments with the panel's chair and changes were implemented accordingly. The report was then finalised and sent to the programmes' management and University Board.

Definition of judgements standards

In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the following definitions for the assessment of the standards:

Generic quality

The quality that, from an international perspective, may reasonably be expected from a higher education Associate Degree, Bachelor's or Master's programme.

Meets the standard

The programme meets the generic quality standard.

Partially meets the standard

The programme meets the generic quality standard to a significant extent, but improvements are required in order to fully meet the standard.



Does not meet the standard

The programme does not meet the generic quality standard.

The panel used the following definitions for the assessment of the programme as a whole:

Positive

The programme meets all the standards.

Conditionally positive

The programme meets standard 1 and partially meets a maximum of two standards, with the imposition of conditions being recommended by the panel.

Negative

In the following situations:

- The programme fails to meet one or more standards;
- The programme partially meets standard 1;
- The programme partially meets one or two standards, without the imposition of conditions being recommended by the panel;
- The programme partially meets three or more standards.

SUMMARY JUDGEMENT

Bachelor's programme

The bachelor's programme Biology of Wageningen University (WU) has a broad and multidisciplinary profile, with an emphasis on fundamental research. This profile fits the expectations of a Biology degree. The panel advises the programme to re-evaluate its current profile to bring out the programme's strengths, discussing it in terms of opportunities and relevance within the distinctive WU research context: a unique combination of both a research and an engineering focus in the area of Life Sciences and Health. The panel established that the intended learning outcomes (ILOs) of the bachelor's programme Biology tie in with the level and orientation of the programmes, including the attainment of relevant skills and knowledge at the required degree level. The panel advises the programme to match its ILOs directly to the Dublin descriptors to make the relation between these and the ILOs more transparent. Formulating clearly separate aims for skills training and including direct references to the expected achievement level of graduates would also help to set the intended degree level more transparently apart. In this way, the achievement level of the programme would be strongly linked to the operation level of graduates in the labour market.

The panel verified that the bachelor's curriculum allows students to achieve the intended learning outcomes. In accordance with its aims, the programme offers a broad programme in Biology with due attention to fundamental research and approaches. The entire field of the discipline is covered while simultaneously, students have the option to specialise in their majors and electives. The panel concluded that the setting and therefore opportunities of the Human and Animal Health aspects of the Biology programme are unique due to the engineering as well as research focus of the university, offering opportunities that cannot be found in a Biology bachelor's degree beyond Wageningen in the Dutch teaching landscape. Students also have sufficient allowance for individual choice.

A true asset of the curriculum is, according to the panel, its growing attention to systems biology, big data analysis and statistics. It demonstrates that the bachelor's programme is aware of changes within the discipline and has updated its programme to these shifting demands. In addition, the panel compliments the programme on its recently restructured skills portfolio, which benefits from a transparent design and clearly indicated learning trajectories. To further improve the existing curriculum design, the panel advocates the introduction of more defined learning trajectories to serve as a backbone for the programme's curriculum to strengthen progressive learning. The panel acknowledges that the introduction of learning trajectories is a project that will take some time due to the large number of Chair Groups and degree programmes involved and may ask for creative solutions. Also, the panel encourages the programme to reconsider the set-up of the bachelor thesis, as it currently may result in study delays if chosen to include experimental research. The panel trusts the programme to consider all options and to find a fitting solution in line with their vision for the bachelor thesis allowing, also, seamless incorporation of experimental project work.

Teaching in the bachelor's programme is, where appropriate, research-led, student-centred and interdisciplinary. Through the varied teaching methods, students are encouraged to actively engage and develop their skills and knowledge in order to obtain the intended learning outcomes of the programme. Teaching and learning takes place in facilities that are excellent, including the use of state-of-the-art equipment and unique opportunities for research. The teaching staff is encouraged to innovate their teaching, resulting in a challenging and interactive classroom. Staff members strong research record and didactical training also influence the student-learning environment positively. In addition, students feel well-supported to plan their individual study trajectories with the help of study advisors. Job market preparation for non-academic careers could be strengthened in the coming years. In addition, attention need to be paid to the effects of the explosive growth of students in many of the Life Sciences programmes at Wageningen University that also impacted on the Biology programme, as lecturers and a significant number of courses are shared. The panel wants to maintain the good quality and challenging teaching-learning environment for Biology students; the panel verified that the programme management and Faculty is on top of this issue. Based on its favourable impression of the quality of staff, the interactive classroom, appropriate and varied teaching methods



and curriculum, the panel concluded that the programme's teaching-learning environment is of good quality and enables students to meet the ILOs.

The panel established that the bachelor's programme Biology benefits from clear WU assessment policies, based on the principle of constructive alignment and on the attainment of the programme's ILOs. Sufficient attention is paid to the validity, reliability and transparency of tests and examinations. The panel compliments the programme on its transparent assessment matrix, which may be even further improved by including defined learning trajectories. The panel noted during its examination of the provided programme documentation that some assessment methods are underused in the bachelor's programme, or only used as bonus assignment or in electives. Simultaneously, it observed that the programme had invested in cutting down on multiple choice testing in response to earlier recommendations, for which it applauds the programme. It concludes that the bachelor's programme has diversified its assessment methods by reducing multiple choice testing and allowing for more diverse testing forms and that assessment as a result is of adequate quality. Nevertheless the use of assessment methods could be further balanced.

The panel also considers the programme's clear guidelines for its thesis trajectory an example of good practice. In the panel's view, the division of roles within assessment of theses requires attention to further strengthen the independency and objectivity of assessment. By and large, the panel agreed with the assessment of theses. It found the feedback on some assessment forms rather minimal but felt reassured after verifying that students received sufficient oral feedback in addition to written feedback. Nevertheless, the panel feels that the transparency of thesis assessment needs to be enhanced and asks the Examining Board (EB) to explore alternative ways to encourage Chair Groups to provide sufficient feedback on final projects. According to the panel, a digital assessment system would hereby be advantageous. It also suggests creating a digital repository, preferably at WU level.

Finally, the panel concluded that the EB safeguards the overall level of assessment in the programme to the best of its abilities. Currently, control mechanisms are heavily directed towards quality control at Chair Group level. Although the panel established that assessment at the programme is of satisfactory standard and covered in most respects by the control cycle directed towards Chair Group level, it strongly advises to tailor the control cycle more directly to programme level. In particular with respect to sample checks of theses and the quality of feedback on theses and internships, further standardisation amongst Chair Groups requires direct action by the EB. The panel was pleased to hear that recently, resources to strengthen quality control mechanisms had been increased in order to do so and trusts the EB to act upon their own ambitions to strengthen their control at programme level. It therefore concludes that quality assurance at programme level is safeguarded.

The panel verified that the assessment system safeguards that students achieve all intended learning outcomes for the bachelor's programme. This conclusion was also supported by the evidence gathered from studying a selection of bachelor theses. The panel encountered one thesis that it considered rather weak. After studying some additional theses at the lower range of the passing grades, it was nevertheless convinced that the programme guarantees the degree level sufficiently and that students meet the required level. The quality of bachelor theses was generally adequate to very good. In addition, the performance of graduates of the programmes in their further studies are further evidence that they have achieved the intended learning outcomes.

The panel assesses the standards from the *Assessment framework for limited programme assessments* in the following way:

Bachelor's programme Biology

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

Master's programme

The master's programme Biology of Wageningen University (WU) gives a broad overview of the latest developments in the field of Biology, ranging from genes to ecosystems. Students of the master's programme follow tailor-made programmes within the strong research-oriented context of 30 of WU's Chair Groups. This profile fits the expectations of a Biology degree. The panel advises the programme to re-evaluate its current profile to bring out the programme's strengths, discussing it in terms of opportunities and relevance within the distinctive WU research context: a unique combination of both a research and an engineering focus in the area of Life Sciences and Health. The panel established that the intended learning outcomes (ILOs) of the master's programme Biology tie in with the level and orientation of the programmes, including the attainment of relevant skills and knowledge at the required degree level. The panel advises the programme to match its ILOs directly to the Dublin descriptors to make the relation between these and the ILOs more transparent. Formulating clearly separate aims for skills training and including direct references to the expected achievement level of graduates would also help to set the intended degree level more transparently apart. In this way, the achievement level of the programme would be strongly linked to the operation level of graduates in the labour market.

The panel established that the programme offers students an abundance of choice of good quality courses within four specialisations in the broad field of Biology. The panel considers the inclusion of systems biology, big data analysis and statistics as optional choices for master students a strength of the programme. Fundamental biological approaches featured in students' teaching, bringing them in contact with cutting edge research and techniques. The studied courses were of a good level for a master's degree, demonstrated the use of up-to-date literature, approaches and methods and clearly reflected the programme's strong embedment in research. Students also receive good skills training suited to their wish to pursue a career in academic research or within the professional field. The panel encourages the programme to consider including elements of the skills-training as offered in the professional route a requirement for all master students, as it believes that also research-minded students would benefit in their further careers from these skills. The panel highly regards the offered internships by the programme; it was pleased to hear that the programme is currently reformulating its objectives and advises to take the attainment of skills hereby as a starting point.

The teaching learning environment for master students strongly benefits from embedment in research at the WU Chair Groups, including unique opportunities for research at the state-of-the-art facilities available in Wageningen. Within the Chair Groups, teaching is research-led, student-centred interdisciplinary with attention for personal growth and development of students. Due to the international nature of the master's degree programme, intercultural exchange is also offered within courses allowing students the benefits of a fully international classroom. This also fits the programme's aims, goals and international oriented career perspectives, and the panel therefore fully endorse the programme's choice for an English-taught teaching environment of high quality. Teaching staff are expert in the field with a strong and highly qualitative research record. The panel is pleased with the excellent support offered by study advisors and praises all staff members' commitment to the students. It verified that the staff's didactic skills, command of English and attention for teaching innovation next to their research abilities contribute to engaging and good-quality classroom interaction. Job market preparation, in particular for non-academic careers, could be further strengthened in the coming years.

The panel established that the master's programme Biology benefits from clear WU assessment policies, based on the principle of constructive alignment and on the attainment of the programme's ILOs. Sufficient attention is paid to the validity, reliability and transparency of tests and examinations. The panel compliments the programme on its transparent assessment matrix. The assessment methods for the master's programme are sufficiently varied and reflect the required level.

The panel also considers the programme's clear guidelines for its thesis examples of good practice. Regarding the master's programme, it welcomes the forthcoming changes to demarcate the goals



for the internship from the thesis more clearly. It advises the programme to consider grading certain aspects of the internship as a pass/fail. By and large, the panel agreed with the assessment of master theses and internship reports. In the panel's view, the division of roles within assessment of theses requires attention to further strengthen the independency and objectivity of assessment. It found the feedback on some assessment forms rather minimal but felt reassured after verifying that students received sufficient oral feedback in addition to written feedback. Nevertheless, the panel feels that the transparency of thesis assessment needs to be enhanced and asks the Examining Board (EB) to explore alternative ways to encourage Chair Groups to provide sufficient feedback on final projects. According to the panel, a digital assessment system would hereby be advantageous. It also suggests creating a digital repository, preferably at faculty level.

Finally, the panel concluded that the EB safeguards the overall level of assessment in the programmes to the best of its abilities. Currently, control mechanisms are heavily directed towards quality control at Chair Group level. Although the panel established that assessment at the programme is of satisfactory standard and covered in most respects by the control cycle directed towards Chair Group level, it strongly advises to tailor the control cycle more directly to programme level. In particular with respect to sample checks of theses and the quality of feedback on theses and internships, further standardisation amongst Chair Groups requires direct action by the EB. The panel was pleased to hear that recently, resources to strengthen quality control mechanisms had been increased in order to do so and trusts the EB to act upon their own ambitions to strengthen their control at programme level. It therefore concludes that quality assurance at programme level is safeguarded.

The panel verified that the assessment system safeguards that students achieve all intended learning outcomes for the master's programme. This conclusion was also supported by the evidence gathered from studying a selection of master theses and internship reports, which reflected that graduates achieve the required degree level for a master's programme. The panel encountered some master theses of exceptional good quality next to theses of sufficient to good level. It found the studied internship reports diverse, both in nature and in quality, but generally of adequate level with some positive exceptions. In addition, the performance of graduates in their postgraduate studies and the entered career paths are further evidence that they have achieved the intended learning outcomes.

The panel assesses the standards from the *Assessment framework for limited programme assessments* in the following way

Master's programme Biology

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

The chair, prof. dr. S. Brul, and the secretary, dr. E. Schröder, of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 29 June 2020

DESCRIPTION OF THE STANDARDS FROM THE ASSESSMENT FRAMEWORK FOR LIMITED PROGRAMME ASSESSMENTS

Organisational structure

Wageningen University (WU) consists of one faculty, the Faculty of Agricultural and Environmental Sciences and as a result has a unique organisational structure. The Faculty comprises 94 Chair Groups, which generally include a chair holder (full professor), academic and support staff, postdocs and PhD students. The Chair Groups also employ the staff responsible for teaching at programme level. All Chair Groups share a common research domain: healthy food and living environment.

The Rector Magnificus of the University is also the Dean of the Faculty and member of the Executive Board of WU. He or she appoints the Board of Education, which consists of four professors and four students. The Board of Education is the legal governing body of all degree programmes; it is responsible for the design, content, quality and financing. Each programme also has a Programme Director and a Programme Committee. The Programme Director implements the Board of Education's directions and is in close contact with the Chair Groups regarding the design, content and quality of the courses provided. The Programme Committee advises the Board of Education on the content and quality of the degree programmes.

The Executive Board of WU appointed four Examining Boards, each responsible for a group of related degree programmes (domain) and Chair Groups. Examining Boards are independent from the Board of Education and include staff members from the domain. The Examining Boards assess the individual study programmes of students and award student degrees. The Examining Boards also appoint the course examiners and monitor changes to the assessment strategy of interim examinations in the annual education modification cycle. The Examining Boards assure the quality of the interim examinations, and for that reason periodically visit Chair Groups to discuss the validity and reliability of the assessments.

Standard 1: Intended learning outcomes

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

Findings

Profile and intended learning outcomes

The bachelor's programme Biology is a three-year programme that focuses on the functioning and complexity of living systems and the interactions with their environment. The programme is broad in its orientation, with a strong fundamental and multidisciplinary approach. Graduates of the programme are prepared to obtain a broad range of theoretical and practical skills and are prepared to pursue further studies within Biology or a related field in Life Sciences, or at the job market at entry level. The aim is for bachelor graduates to acquire the competence to work as a junior specialist. The bachelor's programme has translated its aims in nine intended learning outcomes (ILOs), covering fundamental knowledge acquisition, the application of knowledge to solve basic biological problems, relevant data-gathering and -interpretation skills, (experimental) research abilities including procedural steps to guarantee good academic practice in research, communication skills in both Dutch and English, the ability to design and plan the own learning path.

Students taking the two-years master's programme in Biology are prepared to understand living systems, to help preserve biodiversity and the environment, and to maintain human and animal health and welfare. Next to these general objectives, students follow tailor-made programmes fitting their personal interests, choosing from teaching and research options at 30 of WU's Chair Groups. These individualised study paths take place within the context of four specialisations: 1. Cell and Molecular Biology; 2. Organismal Adaptation and Development; 3. Human and Animal Health Biology; and 4. Ecology and Biodiversity. The panel sees the research-oriented context of the



master's programme as a strong point of the programme. Graduates of the programme obtain a broad overview of the latest developments in the field, ranging from genes to ecosystems. They are prepared for a career in research or in the professional field as specialists in a specific area of Biology which, together with their broad basis stemming from the bachelor and recapitulated briefly in the early phase of the master, helps them to function in multidisciplinary teams. The master's programme has formulated ten ILOs. These focus on critical discussion and analysis, reflection and evaluation of advanced and complex biological concepts, approaches, methods, the fundamental concepts and mechanisms in biology in the chosen specialization and of research techniques, next to the application of research and communication skills. The master's ILOs also include consideration of social, scientific and ethical aspects of biological research that are encountered in work or study in the field of biology, adaptation to a working environment including reflection on the individual performance and cooperation as a specialist in a multidisciplinary, international team to solve a biological research questions or the performance within project-based work.

Based on its study of both sets of ILOs, the panel has some suggestions to fine-tune the current sets of ILOs, whereby attention should be paid to transparently convey the intended formation level. In the panel's view, the differentiation in degree level is currently implied rather than defined between both programmes. For example, the first ILO for the bachelor's programme now reads that graduates 'are able to understand the fundamental concepts and mechanisms in biology at a molecular, cellular, organismal, population and ecosystem level', whereas the first master's ILO aims for graduates to 'critically discuss the latest scientific developments in the biological sciences at molecular, cellular, organismal, population and ecosystem level.' The difference in degree level is suggested by the contrast between 'understands' and 'critically discuss'. Although both ILOs aim for the appropriate degree level, the differentiation in degree level is not transparent. It would be helpful to include a reference to the intended formation level: for the bachelor's programme 'at junior level', for the master's 'at master level (in the chosen specialisation)'. Another example is the expected autonomy of graduates: bachelor graduates are expected to function 'under supervision' (ILO 5, ILO 6) upon graduation, whereas in the ILOs for the master's programme a more independent level is implied yet not defined. Again, both programmes aim for the correct level of operation for their alumni, but it is not transparently formulated. Finally, the panel concluded that skills training, fundamental for differentiating the level of complexity in skills and knowledge achieved in the programmes, is not clearly set apart in the current sets of ILOs. The panel asks the programme to define distinguishable goals for skills training, at the appropriate level, as it would also transparently outline the connection between the programmes' aims and the labour market.

The management confirmed with the panel that it had extensively discussed the suggestion by the previous assessment panel to develop a distinct profile combining fundamental and applied science in line with the mission of university. It had deliberately chosen to uphold its current profile after consultation with various stakeholders; it considered the programmes' fundamental take on science, its defining aspect in comparison to other WU programmes in Life Sciences. This was also confirmed by students, who defined their programmes' profile in terms of 'knowing why' in contrast to 'knowing how' and emphasised that studying Biology at WU was first and foremost a way to satisfy your own curiosity of the way in which the world functions. The panel was pleased to hear that the programmes had formulated a reaction to these earlier recommendations. It considers the programmes' considerations valid yet it also feels that the programmes miss an opportunity to highlight what is unique for studying Biology in Wageningen, namely its excellent and often one-of-a-kind facilities and many rare opportunities offered at Wageningen.

To identify these unique characteristics, the panel advises to look what would be missing from the research landscape in Wageningen if no Biology programme was offered. In addition, it recommends reviewing the profile in relation to the various opportunities offered at WU. This would include fundamental and applied research, but also the combination of many basic sciences within an interdisciplinary environment, the unique WU specialisation options and the valuable connections to professional organisations and research facilities, such as the Lelystad laboratories. This strategy would bring out the attractiveness of studying at Wageningen compared to other programmes in

Biology, both in the Netherlands and in the rest of the world, and could serve as the starting point for a new profile with related ILOs, according to the panel. This would set the WU Biology-programmes apart from other Dutch Biology programmes highlighting the unique combination of both a research and an engineering focus in the area of Life Sciences and Health.

Expectations of the professional field, the discipline, and international requirements

The programmes' ILOs reflect international expectations regarding knowledge attainment and skills achievement. The panel compared both sets of ILOs to the requirements of the Dublin descriptors for both degree levels and concluded that these are met. It advises the programmes to present their ILOs in direct relation to the Dublin descriptors to make this connection more transparent. This would, again, bring out the differentiation in degree level between the programmes more strongly. The panel studied the Domain-Specific Frameworks of Reference for all Biology programmes in the Netherlands, as established in February 2020. It found that the ILOs of both WU Biology-programme are in line with these frameworks.

The Domain-Specific Frameworks sets Biology apart as a discipline of an explanatory and predictive science that is firmly integrated with other scientific disciplines. As a result, Biology graduates are in a key position for addressing societal and economical challenges, ranging from the energy transition to environmental issues, from biodiversity to health. This vantage point requires Biology graduates to be prepared for jobs in fundamental research, applied research and technology, education, communication and policy. Biology graduates are expected to work as specialists and as part of multi-disciplinary teams. This requires them to acquire broad-ranging skills in integrating big data, dealing with dynamical systems and analysing complex networks of interactions, next to an acute awareness of moral dilemmas and strong communication skills. The panel verified that these views are at the core of discussions regarding the direction and (re)design of ILOs and curricula at both programmes. It studied the minutes of meetings with the work field committee and the programmes' education day to gain insight into the way in which these ideas feed into discussions between the management and important stakeholders like the professional field (included in the work field committee) and staff members (gathering at education days). From these materials, it learnt that the programmes are currently redefining the position of big data and looking for ways to include more quantitative methods. It concluded that the programmes take the expectations of the professional field into account when evaluating key programme elements and outcomes.

Considerations

The panel established that the ILOs tie in with the level and orientation of both programmes, including the attainment of relevant skills and knowledge at the required degree level. The panel advises the programmes to match their ILOs directly to the Dublin descriptors to make the relation between these and the ILOs more transparent. Formulating clearly separate aims for skills training and including direct references to the expected achievement level of graduates would also help to set the intended degree level more transparently apart. In this way, the achievement level of both programmes would be strongly linked to the operation level of graduates in the labour market. The bachelor's programme has a broad and multidisciplinary profile, with an emphasis on fundamental research. The master's programme gives a broad overview of the latest developments in the field of Biology, ranging from genes to ecosystems. Students of the master's programme follow tailor-made programmes within the strong research-oriented context of 30 of WU's Chair Groups. In reaction to earlier recommendations, the programmes re-evaluated their profiles, concluding that within the local context their fundamental take and approach was a clear characteristic. The panel acknowledges these findings, but also finds the programmes' current profiling rather general, whereas both programmes benefit from a distinctive context: a unique combination of both a research and an engineering focus in the area of Life Sciences and Health. To bring out their distinguishing position in the field, the panel advises the programmes to discuss their profile in terms of opportunities and relevance within the WU research context.



Conclusion

Bachelor's programme Biology: the panel assesses Standard 1 as 'meets the standard'.

Master's programme Biology: the panel assesses Standard 1 as 'meets the standard'.

Standard 2: Teaching-learning environment

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

Findings

Curriculum: bachelor's programme

The bachelor's curriculum consists of compulsory courses and restricted options (102 EC), which are followed by students in year 1 and 2. From year 2 onwards, students choose one out of four majors (30 EC): Cell and Molecular biology, Organismal Adaptation and Development, Human and Animal Health Biology, or Ecology and Biodiversity. Students complete their studies in year 3 with electives (36 EC) and a BSc thesis (12 EC), in which students investigate a biological question possibly through a short research project for which students have to write a research plan. Students present their results in the form of an article and an oral presentation. As part of their electives, students may opt for an internship. The panel agreed that this design allows for a suitable knowledge base that serves as foundation for specialisation in relevant fields of Biology. Students also have enough room for individual choice.

In the studied student chapter, students indicated that the duration of the bachelor thesis (12 ECTS) limits the options for topics and research methods, e.g. only literature research or a limited experiment are feasible. Not all departments are willing to host students for this limited period, which necessitates students to invest a considerable amount of extra time to be able to do research on their topic of interest at certain chair groups if they want to engage in experimental research. In other instances, experimental research is not possible because of these constraints. Students indicated to the panel that they understood the Chair Groups, but also felt like it created an unequal playing field in some respects. The panel agrees with the students that 12 EC sets a limited timeframe for a thesis project and wonders whether experimental research may be expected to be feasible within this limited amount of time dedicated to the thesis. It would suggest extending the bachelor thesis project from 12 to 18 EC and choose thus, if choices need to be made, for deepening rather than broadening of the individual student's programme. The panel understands, however, that the programme needs to balance these decisions carefully.

The panel sees several solutions to this conundrum. The panel advises the bachelor's programme to strive for more uniformity in the way in which theses are set up, including clearer guidelines regarding the use and gathering of data from supervisors or own generated data. This may address some of the students' worries. The programme could also opt to allow students theses of different sizes always maintaining a minimum length as a basis. If a student opts for experimental research, they exchange elective space for additional thesis credits. Alternatively, the programme restricts the options for the type of research that could be undertaken and tightens up the objectives for the thesis project, e.g. experimental research is no longer regarded an optional choice for the bachelor's thesis. Both suggestions have obvious disadvantages and other solutions may be defined. Nevertheless, the panel considers finding a solution to the indicated problem a necessity, as the current system may result in study delays (and a sense of inequality) amongst students.

A true asset of the curriculum is, according to the panel, its growing attention to systems biology, big data analysis and statistics. It demonstrates that the bachelor's programme is aware of changes within the discipline, and has updated its programme to these shifting demands. The panel studied some of the materials for these courses and concluded that they were of high quality, using up-to-date literature and including relevant skills such as programming at an advanced level. It considers the bachelor's curriculum in this respect well-prepared for the future of Biology. Also, it noted that research of the Chair Groups clearly feeds into the curriculum, which covers fundamental

contemporary biological approaches (so called 'omics') that are central to much of WU's research. The panel also wants to complement the programme on its recently updated skills portfolio that brings together a learning trajectory of professional, academic and research skills. The panel finds it complete and of good quality. It includes presenting, writing exercises, information literacy, collaboration tasks and challenges students to give peer feedback. It also benefits from a transparent learning curve, allowing students to monitor their progression over time. The choice for Brightspace as the digital learning environment for this element is also well-received by the panel.

Based on its study of the curriculum, the panel concludes that the programme's aim to offer a broad programme in Biology is achieved. There is a lot of attention for all aspects of the discipline within the majors, including attention for ecology, plant biology and diversity in line with the university's unique profile and research strengths. According to the panel, this broad basis also comes with a price: the setting of the Biology programme clearly differs from for instance Biomedical or Medical Biology Programmes in the country because there is no direct link with an Academic Hospital and not all biomedical fields are covered by the Chair Groups. However, the WU setting places the Biology programme in a unique position, that is not offered anywhere else in the country. As a result of this unique position, the programme links aspects of nutrition and health, as well as plant and animal sciences, to aspects of food manufacturing and processing in a biomedical context. The programme management and students that the panel met did not consider the lack of coverage of all biomedical fields a matter of concern. They indicated that the difference between the Biology programme in Wageningen and other programmes within the related field was clearly communicated. In their view, the fact that many students opted to stay within these fields for their master's programme in Wageningen was a positive sign, rather than the result of a limitations for progression elsewhere. They saw in the Wageningen orientation added value that easily outweigh potential disadvantages. The panel felt convinced by these comments.

Bachelor course materials studied by the panel proved that course aims adequately feed into the programme's ILOs. Also, the panel verified that course contents are of a suitable level for a bachelor's degree programme. The panel asks the programme to systematically review all course objectives in the near future, as some course aims overlap and as general courses that are accessed by students from various degree programmes often have learning outcomes that are not tailored optimally to the various programmes that deploy this course. As a result, progression of learning in the relevant learning trajectories of an individual programme is not always transparent. For example, the learning objectives for Cell Biology are clearly defined, but it is difficult to gather how it serves as a building block for the progression through the relevant learning trajectory within the Biology programme. The same could be said for mathematical training as part of the Biology programme: the electives Mathematics 2 and Mathematics 3 have identical learning objectives, with only the ability to solve linear regressions as added objective for the advanced course, and it is hard to see how these objectives are part of the corresponding learning trajectory for Biology students. The panel wants to stress that the content of studied advanced courses are of the right level. Reformulating the learning objectives in a more precise manner will, however, highlight the progression of learning more explicitly and could in this way serve as building blocks for learning trajectories within the programme.

The panel advocates the introduction of more clearly defined learning trajectories within the programme, as it considers cohesion within the curriculum one of the programme's weaker points. This observation is among other things related to the unique structure of the Wageningen system, in which students from various degree programmes follow relevant courses at various chair groups. This model has many benefits that are a credit to the bachelor's programme in Biology: it allows for clearly identifiable research-led teaching and for a diverse and varied curriculum with many opportunities for creating individualised, tailor-made study paths that are truly student-centred. In addition, students from different studies in related fields enrol together in these chair group courses, resulting in natural interdisciplinary exchange. At foundation level, this system is challenging. Progression of learning needs to be carefully scheduled to allow students to build a solid knowledge base. The panel observed that currently, compulsory courses are not always offered in a logical order



to create this solid foundation. For example, statistics is offered after 'Animal Behaviour', a course for which students need to be able to apply statistics. This panel finding was also confirmed by bachelor students, who mentioned to feel underprepared in the field of statistics in comparison to students from other WU programmes in this course. If rescheduling of courses would turn out to be impossible, the didactics of courses should be adapted in such a way that deficiency of content can be repaired within the current course run to address the students' concerns.

The panel also acknowledges that the programme has started to work on this challenge: it wants to compliment the programme on its first attempts to define learning trajectories at a recent education day with members of staff and representatives of the professional field, which contributed to the well-designed, recently updated skills portfolio. The Biology programme thinks that the benefits of the current system outweighs any obstacles, but it acknowledges that students concerns and hindrances should be addressed to the programme's best ability. The panel understands the programme's wish to cherish the benefits of the current system, but would like to dare the programme to undertake the challenge to define learning trajectories, starting with the programme's compulsory curriculum. Solutions could be flexible and manifold, ranging from changes to the teaching schedule of Chair Groups, doubling of courses, changes to courses' contents to the creation of a programme-specific course to provide an added framework for progressive learning.

Curriculum: master's programme

In principle, WU offers its master's programmes in English. The decision to do so was based on three arguments. Firstly, English is the lingua franca of international science to which the master's programmes intend to connect. Secondly, graduates are increasingly active in the international labour market. Thirdly, WU wants to attract international students because an international classroom enriches the students' perspective. In addition, the unique teaching setting of the programme at the Chair Groups, in which many internationally oriented and unique degree programmes share courses, makes the use of English as programme language necessary to allow students to enjoy the this rich, interdisciplinary setting. The master's programme Biology has been successful in its international admissions: on average, the annual international student intake over the last three years has been more than 10% and as the programme shares many of its courses with other master's programmes that may have an even higher international intake, international participation in class is always guaranteed.. In addition, several staff members have an international profile, bringing in their international expertise to enrich students' classroom experience. The students commented on the good support system at the programme for international students and considered their study environment truly international. According to the panel, the choice for English as the programme's official language of instruction and communication, and for a programme name in English, is fully justified. The programme has a strong international profile and a regular and consistent international intake, is committed to the concept of an international classroom and fully prepared to tailor to international students' needs.

The panel established that the master's curriculum (120 EC) is designed to fit the broad interests of students, and allows students to tailor these interests to the strengths of the research of the 30 chair groups involved in teaching in the master's programme. The curriculum offers students coherence in four specialisations of choice: Cell and Molecular Biology; Organismal Adaptation and Development; Human and Animal Health Biology; and Ecology and Biodiversity. In each specialisation, students follow two specialisation courses to deepen their knowledge of and to develop skills relevant for the scientific discipline of the specialisation. In addition, they may opt to include courses related to their specialisation in their elective space. The master only offers one compulsory course 'Frontiers in Biology' (6 EC), which aims to bring students up to speed with the latest developments in the discipline. Students and the panel both considered this course an excellent curriculum element. Students also receive skills training (12 EC) at an advanced level, complete a master's thesis within the remits of their specialisation (36 EC) and prepare themselves for their further careers by taking an (academic) internship (24 EC). The panel considers the curriculum design representative for the WU system: it allows students optimal freedom to tailor their study paths to their individual interests

while simultaneously shaping these individual paths in recognisable specialisations. Academic skills are given sufficient attention.

Teaching at master's level is fully embedded in a research context of good quality. As a result, the master's programme has a strong academic character. The panel was pleased to note the inclusion of relevant systems biology, big data analysis and statistics as optional choices for master students. Again, fundamental biological approaches including attention for 'omics' feature in students' teaching and research experiences, bringing them in contact with cutting edge research and techniques. The studied courses were of a good level for a master's degree, demonstrated the use of up-to-date literature, approaches and methods and clearly reflected the programme's strong embedment in research. The panel looked hereby closely at level 3-courses, as these can be followed by both bachelor and master students, whereby both student groups have dedicated learning objectives at the intended degree level. This balancing act between the two degree levels presents challenges for their design and content level. The panel found that the studied level-3 courses stroke the right balance; tasks, learning objectives and content were sufficiently tailored towards the intended degree level just as the assessment methods and grading. Master students confirmed these panel observations. They felt sufficiently challenged in these courses and also saw a clear differentiation in level with bachelor students.

Cohesion and admission at master's level

Based on the curriculum design of the master's programme, cohesion within cohorts could be at stake according to the panel. Students only share one mandatory course that is uniquely designed for the master's programme in Biology in period 3. The panel wondered whether a foundation course was not missed, in particular by students who were new to Wageningen. As the programme enjoys a considerate international intake, a foundation course could also function as a levelling course next to cohort-building.

The panel discussed these points in detail with both staff members and students. It learnt that in the admission process, ample attention is paid to potential deficiencies in an incoming students' profile in discussion with the Wageningen study advisors. If these deficiencies are too strong, students have to take additional courses as a tailor-made premaster's programme prior to being granted access to the master's programme. Small deficiencies would be addressed relevant courses with a rapid recapture of area specific foundational knowledge from the bachelor, or in one for all students generic levelling and introductory foundational course. When asked, neither students nor staff members really felt the need for a foundational, introductory or levelling course at the start of the master's programme; they preferred the current set up with additional elective space and felt sufficiently vetted and prepared for the advanced master's level and well-supported by the Wageningen study advisors. To the panel, the admission procedure and actions taken to address deficiencies seem sound though it advises the programme to maintain an open eye on how other Biology programmes address the issue given the dynamics of the field.

With respect to cohort-building, students who did not obtain their bachelor's degree in Wageningen indicated that they at first felt slightly lost in their courses as they missed the reference point that an introductory course usually offers. They missed the social function of such a course in bringing together a new cohort of master students in Biology. They emphasised, however, that they were instantly swayed by the Wageningen system when actually starting the programme and felt supported by staff members and fellow students, from the Biology programme and other programmes alike. Students indicated that the study association could also play an important role in cohort-building. The panel was pleased to hear that students felt sufficiently supported and welcomed within the programme.

Job market preparation

Bachelor's graduates are not necessarily expected to directly enter the labour market; within the Dutch system, most opt for continuing their studies at master's level. The panel found the programme's professional skills training, included in the portfolio, of good quality and felt that



bachelor's students received the right kind of skills to enter the job market as junior employees. In addition, students may opt for an internship as part of their electives, which gives them an opportunity to explore the professional field outside of the remit of the university. Students indicated, however, that the bachelor's internship was often regarded as an element that 'took away' an opportunity for specialisation and that if taken, students often chose to take an internship as an addition to regular electives, resulting in study delays. Students also would welcome further help with finding suitable internships, as they found it hard to go about on the support provided. The panel was surprised about the negative connotation of the bachelor's internship with students. It advises the programme to review its communication strategies regarding the aims of the internship and to present it in a more positive light. In the panel's view, the internship is good medium explore opportunities in the professional field. It agrees with the programme that it should be an elective. Instead of it being perceived as an option restricting specialisation, it would ideally be regarded as a prestigious option. A suggestion could be to explore whether the bachelor's internship may also be included in an honour's programme.

The master's programme offers curriculum elements that are included to help students to prepare for a further career, notably the internship (24 EC) and skills training (12 EC). Students opting to pursue an academic career may direct the internship towards this goal: they will often opt for taking their internship at a prestigious research institute or university, or at another WU Chair Group, and actively partake in fundamental research. Students opting for a non-academic career are encouraged to take their internship outside of the boundaries of a research group, preferably in the field of their professional interest. The panel studied the master's internship in detail, as the outcomes also contribute towards the achievement of the programme's ILOs. It considered the internships, across the spectrum of both academic and professional, of very high quality. Nevertheless, the panel finds it necessary to set the goals and assessment criteria of the internship even more clearly apart from those of the theses. It advises to make the internship more competency-driven and centred on the attainment of skills. The programme management indicated that many of the panel's suggestions regarding the internship are shared amongst members of the programme. Initiatives to change the setup of the internship have already been suggested to be implemented in the coming period. These changes are eagerly awaited by the panel.

In addition to the internship, master students follow skill courses. After consultation with their study advisor, academic-oriented students take a 'Proposal Writing' course (12 EC) to fulfil the programme requirements regarding professional skill training. For a non-academic career, the programme offers students the 'Academic Consultancy Training' course (9 EC) in combination with 'Modular Skills training' course (3 EC) to meet these requirements. The panel studied the materials for the non-academic skills training courses and found these very well organised and of high quality. It would encourage the programme to consider making the *Academic Consultancy Training* course a requirement for all master students, as it believes that also research-minded students would benefit in their careers from these skills.

Students of the programmes indicated in the student chapters studied by the panel that they would welcome additional information on the possibilities for a career outside of academia. This sentiment was repeated in discussion with the panel. The panel identified many initiatives allowing students to explore the professional field beyond academia. It understood, however, that most students are easily swayed by the more academically oriented paths as students feel that this is within the 'comfort zone' of their teachers. This is, to the panel's view, understandable as students' teachers are by and large trained academics. Good options for professional orientation exist, but the panel also agrees with the students that that probably more could be done to introduce students to the professional field beyond research. In discussion with the panel, both student groups suggested to organise more field trips to relevant companies as part of coursework and to organise alumni markets, bringing alumni of the programme into contact with current students. In the student chapter, bachelor students also suggested to invite more guest lectures by professionals working in Biology related fields, other than education, science and consultancy. The panel found all of these suggestions

excellent and encourages the programmes to explore these options. Notwithstanding these remarks, the panel considers job market preparation at both programmes in line with the programme's aims.

Teaching-learning environment

The WU system brings research and teaching together at the Chair Groups. Students praise the interaction between both and feel embedded in a teaching environment that directly benefits from cutting edge research and excellent facilities. Besides research-led, teaching at both programmes is without effort interdisciplinary. This is another advantage of the Chair Group-system. Most courses are shared between degree programmes in related fields, bringing together different approaches and view points in the classroom. At master's level, international students enrich this classroom with (inter)cultural exchange. In some courses, bachelor students in Biology also benefit from an international classroom. While the bachelor's programme is a Dutch-taught programme, some courses at chair groups are shared with English-taught bachelor programmes with an international intake. As the bachelor's programme is officially Dutch-taught, students may opt in shared courses with international students to take examinations in Dutch.

Bachelor students indicated in the student chapter that recently, many courses are oversubscribed. In the last couple of years, WU's strong reputation and internationalisation policy has resulted in explosive growth. The programmes in the Life Science at WU are amongst the growing programmes; Biology shares many courses and lecturers with other programmes in the Life Sciences and as such is also affected by this growth. The programme management is well-aware of this matter and tries to find solutions together with the Chair Groups and Faculty. Sometimes, courses are scheduled more often or offered in two (or more) periods. Also, new teaching methods and digital means are used to reach out to larger student groups. The programme aims to secure the interactive and engaged classroom in a small-scale setting for students, but is also still adapting to the sudden growth. The panel feels that the programme is making the right choices and is convinced it will continue to offer a challenging and interactive degree programme tailored to the students' high expectations.

Both programmes offer students a wide range of choices: between specialisations, between courses within specialisations, between Chair Groups and between research options to approach important programme elements, such as the thesis at bachelor's level and the thesis, internship and skills training at master's level. Students have plenty of opportunities to design their own learning paths, making the programmes in essence student-centred. They are supported in their choices by the programmes' study advisors and good study guides that outline all requirements for constructing a coherent study path. The panel considers the offered support of good quality. This impression is also confirmed by students, who are feel equipped and supported to create their own study path. They consider the programmes feasible and did not mention any hindrances to the feasibility of their studies, apart from delays with their theses. At bachelor's level, this delay is related to the size of the thesis, as discussed above. At master's level, the design of the thesis process is conducive to completion in the panel's view. Delays are more likely to be the result of students' individual choices and challenges rather than to stumbling blocks in the thesis process.

Based on the studied materials and courses, the panel concluded that courses in the programmes are in line with the programmes' objectives and directed towards active student engagement. At bachelor's level, students are often challenged to actively partake in courses next to sitting in lectures. Students take (computer) practicals and partake in field work and they engage in group work and discussions in tutorials. Most courses use a combination of teaching methods suited to the course objectives. Even lectures often include exercises to ensure student engagement. At master's level, teaching methods are also varied and tailored to the students' needs. They include practicals, skills training, lectures and tutorials, the latter often on a one-to-one supervision basis (in the internship and during the master thesis trajectory). The panel compliments the programmes on their use of the online platform Brightspace for offering course content to students, which it found well-designed and –adapted to the programmes' needs. It noted, however, that detail level of information varied widely between courses. As the programmes recently moved to Brightspace for their course



organisation, the panel considers these differences in detail level 'work in progress' related to the recent change. It encourages the programmes to get their content presentation more standardised.

Students of both programmes appreciate the variety of teaching methods and compliment their teachers on their teaching style, which is considered interactive, engaging and challenging. From the studied materials, it also followed that teachers use a variation of teaching methods, ranging from blended learning to peer review practices. Innovation in teaching is also promoted and encouraged by the programme management. At the annual staff education day, new methods and innovation of teaching is discussed and staff members receive training and support for course development. The panel concluded that the programmes' learning methods are appropriate and well-directed towards students' needs and expectations.

The panel also looked into the programmes' facilities and the way in which they contribute to the students' learning-environment. They studied the available documentation regarding the facilities at Chair Groups and questioned students regarding their access to the available facilities. The panel concluded that the Chair Groups involved in teaching at the programmes in Biology have state-of-the-art research facilities, ranging from greenhouses to specialised cell, computer and wet laboratories. In particular the possibilities to do research work not only at university facilities but also at the facilities of closely affiliated research institutes allows for students to profit from a range of experimental environments reaching from typical fundamental biology research laboratories with state of the art high end microscopy and 'omics' technologies, to for instance more large scale fermentation facilities or the plant as well as animal breeding facilities, the latter prominently present at the WU Bioveterinary facilities in Lelystad. Students confirmed that they had access to many of these facilities during their bachelor and master thesis research. Practicals were taught using all the necessary equipment, which again was of very good quality. When students need to use equipment, it is readily available; they are very enthusiastic about the WU resources, which highly contribute to their skills training and to their knowledge of current developments and innovations within the discipline. Finally, WU has on campus two of the most known and famous food manufacturing companies, Friesland Foods and Unilever, top places to provide (research) internships. The panel concluded that teaching at both programmes take place at facilities of the highest quality.

Teaching staff

The panel was presented with a staff list of 297 staff members employed at 30 different Chair Groups, who contribute to the teaching in the bachelor's and master's programme. Teaching staff generally teach both at the bachelor's and the master's level. The panel verified that the research credentials of the teaching staff are very good to excellent. Many staff members have been recipients of highly competitive research grants, which allows them to integrate their high-quality research directly in their teaching. This reinforces research-led teaching. PhD students who supervise thesis students are given a training to do so and the same goes for master students who assist during lab practicals at bachelor's level. The level of English command of staff members is assessed at C2 level prior to their participation in the master's programme. If necessary, new staff will receive further training in English to guarantee an English-taught learning environment of good quality. The panel also found that teaching staff is well-supported to excel in their teaching practice. Innovation of learning is encouraged and the improvement and obtainment of didactic skills, either through a teaching qualification (Basiskwalificatie Onderwijs), are monitored by the programme and supported by the university. The panel fully supports a new initiative to fit teaching into the career development plan for staff, by creating positions for so-called Principle Educators (PE's) as a counterpart to Principle Investigators (PI's).

The numbers of lecturers that have acquired a teaching qualification are relatively low at WU in comparison to other universities. Currently, 86 staff members have completed a BKO or similar, whereas 73 members of staff are in the process of doing so. Obtaining a BKO or another relevant teaching qualification is a requirement for new permanent staff and staff in tenure track, whereas experienced staff whose teaching is evaluated positively are exempted from BKO-training but their teaching and teaching methods are reviewed. To the previous assessment panel, these low BKO-

rates were a concern. The current assessment panel concludes that the programme invested in the didactic training of staff, both incoming and already active within the programme, and feels that these earlier concerns have been sufficiently addressed. The panel would suggest to the programme to engage with the university in promoting for more experienced staff the development of tailor-made BKO-trajectories, as is often observed at other universities.

Students speak highly of their teachers, calling them very approachable, committed and knowledgeable; they feel fully supported throughout their studies by their study advisors, who they considered very approachable and easy to reach and whose advice they considered of excellent quality. They also feel taken seriously as emerging scholars in their own right. Furthermore, students feel that their feedback on courses is acted upon. In the 2019 NSE, bachelor students assessed the teaching staff with a 4.3/5 and master students assessed the teaching staff with a score of 4.2/5. Based on their credentials and the good reports by their students, the panel considers the staff as of excellent quality.

Considerations

Bachelor's programme

The panel verified that the bachelor's curriculum allows students to achieve the intended learning outcomes. In accordance with its aims, the programme offers a broad programme in Biology with due attention to fundamental research and approaches. The entire field of the discipline is covered while simultaneously, students have the option to specialise in their majors and electives. The panel concluded that the setting and therefore opportunities of the Human and Animal Health aspects of the Biology programme are unique due to the engineering as well as research focus of the university, offering opportunities that cannot be found in a Biology bachelor's degree beyond Wageningen in the Dutch teaching landscape. Students also have sufficient allowance for individual choice.

A true asset of the curriculum is, according to the panel, its growing attention to systems biology, big data analysis and statistics. It demonstrates that the bachelor's programme is aware of changes within the discipline and has updated its programme to these shifting demands. In addition, the panel compliments the programme on its recently restructured skills portfolio, which benefits from a transparent design and clearly indicated learning trajectories. To further improve the existing curriculum design, the panel advocates the introduction of more defined learning trajectories to serve as a backbone for the programme's curriculum to strengthen progressive learning. The panel acknowledges that the introduction of learning trajectories is a project that will take some time due to the large number of Chair Groups and degree programmes involved and may ask for creative solutions. Also, the panel encourages the programme to reconsider the set-up of the bachelor thesis, as it currently may result in study delays if chosen to include experimental research. The panel trusts the programme to consider all options and to find a fitting solution in line with their vision for the bachelor thesis allowing, also, seamless incorporation of experimental project work.

Teaching in the bachelor's programme is, where appropriate, research-led, student-centred and interdisciplinary. Through the varied teaching methods, students are encouraged to actively engage and develop their skills and knowledge in order to obtain the intended learning outcomes of the programme. Teaching and learning takes place in facilities that are excellent, including the use of state-of-the-art equipment and unique opportunities for research. The teaching staff is encouraged to innovate their teaching, resulting in a challenging and interactive classroom. Staff members' strong research record and didactical training also influence the student-learning environment positively. In addition, students feel well-supported to plan their individual study trajectories with the help of study advisors. Job market preparation for non-academic careers could be strengthened in the coming years. In addition, attention needs to be paid to the effects of the explosive growth of students in Life Sciences Programmes at WU that also impacted on the Biology programme, as lecturers and a significant number of courses are shared. The panel wants to maintain the good quality and challenging teaching-learning environment for Biology students; the panel verified that the programme management and Faculty is on top of this issue. Based on its favourable impression of the quality of staff, the interactive classroom, appropriate and varied teaching methods and



curriculum, the panel concluded that the programme's teaching-learning environment is of good quality and enables students to meet the ILOs.

Master's programme

The panel established that the programme offers students an abundance of choice of good quality courses within four specialisations in the broad field of Biology. The panel considers the inclusion of systems biology, big data analysis and statistics as optional choices for master students a strength of the programme. Fundamental biological approaches featured in students' teaching, bringing them in contact with cutting edge research and techniques. The studied courses were of a good level for a master's degree, demonstrated the use of up-to-date literature, approaches and methods and clearly reflected the programme's strong embedment in research. Students also receive good skills training suited to their wish to pursue a career in academic research or within the professional field. The panel encourages the programme to consider including elements of the skills-training as offered in the professional route a requirement for all master students, as it believes that also research-minded students would benefit in their further careers from these skills. The panel highly regards the offered internships by the programme; it was pleased to hear that the programme is currently reformulating its objectives and advises to take the attainment of skills hereby as a starting point.

The teaching learning environment for master students strongly benefits from embedment in research at the WU Chair Groups, including unique opportunities for research at the state-of-the-art facilities available in Wageningen. Within the Chair Groups, teaching is research-led, student-centred interdisciplinary with attention for personal growth and development of students. Due to the international nature of the master's degree programme, intercultural exchange is also offered within courses allowing students the benefits of a fully international classroom. This also fits the programme's aims, goals and international oriented career perspectives, and the panel therefore fully endorse the programme's choice for an English-taught teaching environment of high quality. Teaching staff are expert in the field with a strong and highly qualitative research record. The panel is pleased with the excellent support offered by study advisors and praises all staff members' commitment to the students. It verified that the staff's didactic skills, command of English and attention for teaching innovation next to their research abilities contribute to engaging and good-quality classroom interaction. Job market preparation, in particular for non-academic careers, could be further strengthened in the coming years.

Conclusion

Bachelor's programme Biology: the panel assesses Standard 2 as 'meets the standard'.

Master's programme Biology: the panel assesses Standard 2 as 'meets the standard'.

Standard 3: Student assessment

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

Findings

System of assessment

The assessment policy at WU is based on the principle of constructive alignment and on the realisation of the programme's ILOs, which have a clear relation to the learning outcomes of the constituting courses or parts of the curriculum. This WU policy informs the system of assessment at the bachelor's programme and master's programme in Biology. The panel found that these documents and policies are very well designed and extensive. As a result, assessment in the programmes is well-regulated. In addition, the panel established that the programmes have transparent assessment matrices, paying attention to the six cognitive domains of knowledge attainment ranging from least to most complex. An assessment strategy is drawn up for all courses and curriculum parts linking course objectives to the programmes' ILOs, and the panel verified that teaching and learning activities make the achievement of these outcomes feasible. The panel recommends to also include learning trajectories in the assessment matrices to demonstrate the way in which knowledge and skills are gradually acquired in progression.

The assessment matrices also give clear insight in the used assessment methods, which are varied. The panel is satisfied with the way in which the diversity of assessment methods is used in the master's programme, allowing for lots of skills and knowledge testing at an analytical advanced level. At bachelor's level, the panel was pleased to note that the use of multiple choice questions as solely testing method was now reduced to first-year courses only and that greater variety of testing methods could be verified for the second- and third-year courses in line with the recommendations of the previous assessment panel. Even though, it noted that some assessment methods could be more prominently used, as some are only used incidentally or only in bonus assignments, for example performance in discussion sessions. Other assessment methods, such as the assessment of laboratory/field/computer performance are regularly used, but often do not contribute towards the determination of the final course grade. As a result, assessment at bachelor's level leans towards knowledge testing. The panel concluded that the bachelor's programme had diversified its assessment methods and improved the variety and quality of assessment, but that the use of assessment methods could be further balanced towards the assessment of skills.

Assessment can be formative or summative according to the documentation studied and reflects the level of the programme. The panel studied the formative assessments and answer models for several sample courses at bachelor's and master's level. It found that these reflect the content of courses and are aligned with the learning goals and teaching methods. Students indicated that they receive sufficient feedback. Overall, the panel finds that there is enough attention for the validity, reliability and transparency of assessment.

Assessment of final works

Bachelor students execute a thesis of 12 EC in total at a Chair Group of choice, resulting in a wide variety of potential avenues for research. The execution of research is evaluated based on four main components: the research competences (30% of the final grade) and practical skills (10%) if a student opted for experimental research. If a student opted for an alternative form of research (for example literature study or an analysis of a given data set), the execution of the research is evaluated as part of the research competencies (40%). Each of these four main categories should have an assessment of 'sufficient' (>5.5) for a thesis to pass. Research competence, practical skills and report are assessed by two members of the Chair Group (first and second reader), of which at least one should be an assistant professor, associate professor or full professor. The other member should have at least an MSc degree. The final presentation is assessed by the Biology team, which also sets the final mark for the BSc thesis under responsibility of the course coordinator (as thesis examiner).

The panel compliments the bachelor's programme on its clear thesis manual that systematically and clearly lists the thesis process, a time scale, the assessment and expectations for students. It found the regulations concerning assessment transparent, yet has a point for improvement: it asks the programme to evaluate the position of the assessor, in particular when this daily supervisor is a PhD candidate who also has a relation of dependency towards the chair holder, who is appointed as first assessor. The programme pointed out that the Biology team who advise the course coordinator, who in turn functions as the official examiner of the course, play a role in safeguarding the independency of the assessment. It indicated to never have heard of any concerns of junior staff members regarding their position of dependency to the first assessor. The panel asks the programme to clarify the division of tasks in its information on assessment. The division should be: students perform their thesis under a daily supervisor, who can be a PhD student or post-doc. They are assessed by a first assessor, probably here the principle investigator supervising the PhD student and a fully independent examiner who should be appointed by the Biology team and can also be the Biology team member who coordinates the course. Both assessor and examiner need to be staff members, the latter of the WU. The panel sees the involvement of the Biology team as a positive, as this serves as an additional control mechanism. The panel trusts the programme to strike a balance.

The master's programme is concluded with an internship (36 EC) and a thesis (24 EC). The thesis is assessed by the supervisor(s) involved, whereas the chair holder at the Chair Group at which the thesis is taken acts as independent, second assessor. The final oral examination is a discussion with



the supervisor, the examiner or in some cases, a supervisor outside the Chair Group. Upon reflection, the panel finds this system hard to follow. It would suggest to make the various roles in assessment more explicit and fully standardised across all Chair Groups, also in the information provided to students in the thesis guide: there should be a daily supervisor, an assessor and a fully independent examiner, who is responsible for the final mark. The different main components that are scored are: research competence (30-60% of the final grade), the thesis report (30-60%), the colloquium (5%-10%) and the final examination (5%-10%). The average grade for all main components should be at least 5.5 for a pass. Chair groups decide on the relative weight of the various components based on the research proposal. This makes it possible for the assessment to reflect the particular nature of the research topic and methodology, which is considered a sensible measurement to the panel to reflect the variations of approaches and complexity of certain methods though care should be taken to avoid extreme deviations. For the transparency of assessment, a standardised rubric is used.

Internships are in principle followed at an external organisation or appropriate company, including the associated research facilities in Wageningen. . Two supervisors are appointed: an internship supervisor on behalf of the internship provider and an academic supervisor. WU is always responsible for the assessment of the internship and the final grade. The assessment of the internship is based on five elements, which are evaluated as professional skills (20-50% of the final grade), report (20-50%), self-reflection (10-30%), presentation (5%) and examination (5%). The relative weight of the various components is hereby decided upon prior to the internship. A standardised rubric is used for grade explanation. This setup allows students to take their internship within an academic research context at a WU Chair Group. As a result, however, internship reports often resembled theses (see also Standard 4). As discussed above under Standard 2, the panel advocates changing the objectives of both projects to demarcate transparent, separate assessment criteria. Potentially, the programme may also want to investigate the option to make reflection, as a defining element of the internship, assessed as a pass/fail as it considers formulating satisfying grade descriptions to encompass all forms of reflection difficult to achieve.

The panel found the studied assessment forms transparent in their design and by and large agreed with the assessments and grades given by the examiners at both programmes, adequately reflecting the level of the assessed student works. Nevertheless, after studying a sample of theses and internship reports and their assessment forms, the panel concluded that many of the studied forms missed constructive feedback and/or a transparent grade justification. From interviews with students and teachers, the panel learnt that students also received constructive and satisfying oral feedback in addition to these forms. The lack of written feedback is therefore impeding the transparency of assessment rather than the quality. Also, some forms missed the required signatures of the supervisors involved in assessment.

These omissions should be addressed with urgency in the panel's view, as attention to the quality of feedback was already a recommendation by the previous assessment panel. The panel sees an important role hereby for the Examining Board (EB). Members of the EB explained that they always raise this matter at their visits to the Chair Groups, but that change takes time. It has, however, the EB's full attention. To address this issue once and for all, the panel suggests to make grade justification, regulated by a word count, a mandatory part of a digitalised assessment procedure. In addition, the panel recommends documenting the assessment of first and second reader on separate (electronic) forms to allow external reviewers to verify that assessments have been construed independently. From the documentation provided, it followed that the EB is currently exploring an electronic assessment route. The panel was pleased with these initiatives and trusts the EB and programme to improve written feedback in the following years. As the panel also encountered some archiving problems at the bachelor's programme, it advises in line with an electronic assessment system to also create a digital thesis repository at WU level, rather than at programme or Chair Group level.

Examining Board

The panel verified that the EB for the bachelor's and master's programme in Biology is sufficiently independent from the programmes and that its composition fulfils all legal requirements. The panel studied the EB's assessment practices based on the provided documentation and discussed assessment in the programmes with representatives of the EB. In both programmes, fraud and plagiarism detection is ensured by relevant checks and regulated by clear regulations. Assessment policies are up to date and are regularly amended. The EB also assures to its best ability that students cover all the ILOs in their individual study trajectories, thereby assuring that students have achieved the intended end level upon graduation. Based on these findings, the panel therefore concluded that the EB is in control of the quality of assessment.

The panel also found areas for improvement to tighten up the quality control cycle of assessment, specifically at programme level. These suggestions are related to the specific WU structure, in which Chair Groups are involved in teaching at many programmes simultaneously. For organisational purposes, the EB's control cycle is directed towards checks at Chair Group level. The panel verified that all necessary checks are regularly scheduled at Chair Group level and is convinced that the EB's control of the quality of assessment is sufficient. For example, prior to the scheduled chair board visits that happen every six years, the EB organises thesis sample checks and looks into the quality of assessment of courses. When necessary, advice for improvement is provided by the EB. As a result of this control system, programme assessment is covered as part of the quality control cycle organised at Chair Group level.

Nevertheless, according to the panel, this control system also creates some tension and potential oversights in relation to quality control at individual programmes as checks at chair board level do not necessarily result in a systematic review of individual programmes in the context of their specific curriculum. This is apparent at the programmes in Biology, which rely, for their teaching, on the involvement of many Chair Groups that are reviewed at different times. This makes a blueprint of assessment at the specific programme difficult to monitor for the EB and also hard to address for the programme, as the programme management shares the panel's concerns. Also, the existing control system does not guarantee an independent sample check on the quality of theses at regular intervals for specific programmes. The panel understood that Biology theses have been regularly reviewed as part of Chair Group thesis sample checks, but it nevertheless recommends building in scheduled sample checks for individual programmes. Regular sample checks would also allow for a consistent check on the provision of feedback and justification of grades, and would give the EB the chance to monitor and compare assessment practices at Programme and Chair Group level more easily.

To address these tensions and to build in mechanisms to countercheck potential oversights, consistent support and resources are needed to allow the EB to increase its controlling capabilities targeted to individual programmes. The panel was pleased to hear that recently, resources to strengthen quality control mechanisms have been doubled in order to do so. It considers the EB's formulated goals to strengthen quality control at programme level adequate, but underline the importance to now move forward to action and implementation. The panel strongly recommends investing these resources in more standardised checks within the context of individual programmes. It also encourages closer monitoring of the assessment practices at the various Chair Groups, as the panel observed in the studied assessment forms hints towards variations in interpretation of the used rubrics. Hereby, it would like to suggest to share the responsibility for setting a grade among Chair Groups to increase the perceived objectivity of grading and to share examining practices. The EB recognised this observation and it stressed that it worked towards greater standardisation with the various Chair Groups, to the panel's reassurance.

Considerations

The panel established that the programmes in Biology benefit from clear WU assessment policies, based on the principle of constructive alignment and on the attainment of the programme's ILOs. Sufficient attention is paid to the validity, reliability and transparency of tests and examinations. The panel compliments the programmes on its transparent assessment matrices, which may be even



further improved by including defined learning trajectories. The assessment methods for the master's programme are sufficiently varied and reflect the required level. The panel noted during its examination of the provided programme documentation that some assessment methods are underused in the bachelor's programme, or only used as bonus assignment or in electives. Simultaneously, it observed that the programme had invested in cutting down on multiple choice testing in response to earlier recommendations, for which it applauds the programme. It concludes that the bachelor's programme has diversified its assessment methods by reducing multiple choice testing and allowing for more diverse testing forms and that assessment as a result is of adequate quality. Nevertheless the use of assessment methods could be further balanced.

The panel also considers the programmes' clear guidelines for their thesis trajectories examples of good practice. Regarding the master's programme, it welcomes the forthcoming changes to demarcate the goals for the internship from the thesis more clearly. It advises the programme to consider grading certain aspects of the internship as a pass/fail. By and large, the panel agreed with the assessment of theses at both programmes, and with the assessment of internship reports at master's level. In the panel's view, the division of roles within assessment of theses at both programmes requires attention to further strengthen the independency and objectivity of assessment. It found the feedback on some assessment forms rather minimal but felt reassured after verifying that students received sufficient oral feedback in addition to written feedback. Nevertheless, the panel feels that the transparency of thesis assessment needs to be enhanced and asks the Examining Board (EB) to explore alternative ways to encourage Chair Groups to provide sufficient feedback on final projects. According to the panel, a digital assessment system would hereby be advantageous. It also suggests creating a digital repository, preferably at WU level.

Finally, the panel concluded that the EB safeguards the overall level of assessment in the programmes to the best of its abilities. Currently, control mechanisms are heavily directed towards quality control at Chair Group level. Although the panel established that assessment at the Biology programmes is of sufficient standard and covered in most respects by the control cycle directed towards Chair Group level, it strongly advises to tailor the control cycle more directly to programme level. In particular with respect to sample checks of theses and the quality of feedback on theses and internships, further standardisation amongst Chair Groups requires direct action by the EB. The panel was pleased to hear that recently, resources to strengthen quality control mechanisms had been increased in order to do so and trusts the EB to act upon their own ambitions to strengthen their control at programme level. It therefore concludes that quality assurance at programme level is safeguarded.

Conclusion

Bachelor's programme Biology: the panel assesses Standard 3 as 'meets the standard'.

Master's programme Biology: the panel assesses Standard 3 as 'meets the standard'.

Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

The panel verified at both programmes that the assessment system safeguards that students achieve all intended learning outcomes. In addition, it looked at the final projects and the performance of graduates of the programmes to establish whether graduates function at the required degree level.

Final projects

For the bachelor's programme, the panel initially studied 15 theses of graduates. The panel found in this sample two theses wanting of quality, considering the analyses too weak. Upon investigation, it turned out that one of these two theses was a draft version that mistakenly had been archived; the final version could not be retrieved. The involved supervisor stressed in communication to the panel that the final version of this draft had been of sufficient quality, addressing some of the flaws

identified by the panel in the draft version. As the panel could not verify these statements, it decided to discard this particular thesis from the thesis sample. To verify the programme's exit level, the panel requested four additional bachelor theses at the lower end of the grade range, resulting in the assessment of a thesis sample of 18 finished projects in total. The panel found all additional theses of sufficient quality. As the panel felt reassured by these findings regarding the overall quality of weaker theses at pass level, it concluded that graduates of the bachelor's programme achieve the required degree level.

The theses reflected that graduates of the bachelor's programme are able to formulate a relevant biological research question and to choose an appropriate method to answer this question. Panel critique mainly focused on the analytical and interpretive skills as well as the writing skills of students. The panel noted a wide range of topics within the field of Biology in line with the programme's profile and orientation. All in all, the panel considered the theses of adequate to very good level. The panel encountered in its sample experimental work, research based on pre-collected data and literature reviews. The programme management explained that these variations in method are the result of the character of some of the chosen topics and the available resources at the Chair Group at which the project was undertaken. As discussed under Standard 2, the panel understands how this variety comes into play but would advise to strive for more uniformity.

For the master's programme, the panel studied 15 internship reports and 15 master theses. It encountered both excellent work that surpassed what could be expected for a graduate of a master's programme and more limited studies in scope and orientation. The panel concluded that all theses and internship reports met the requirements for a master's degree, including some theses of excellent quality. Again, students identified relevant topics in their master theses within the broad domain of Biology and formulated suitable research questions that were adequately addressed using relevant methods and approaches. Strong theses benefitted from a strong theoretical framework and good analyses demonstrating the graduates' research capabilities resulting in valuable conclusions and recommendations for further research. A lack of critical reflection or too broad a topic often lay at the basis of weaker theses.

The panel found the internship reports of diverse nature. Many were similar in setup to a thesis, de facto resulting in students writing two master theses. Others addressed problems in a more applied setting. These findings are in line with the current design of the internship and allowances. At the moment, the panel noted that the quality of internship reflections are varied. As it considers this element a defining element of the internship, these variations require attention. Some were excellent: in-depth analyses of the learning process, including a solid consideration of how personal goals and learning points had shifted over the period of research. Others were adequate, yet less in-depth and lacked clearly formulated personal learning goals with ample relevance to the research setting in which students exercised their internship. The programme management indicated that these panel observations have also been internally signalled. Changes have already been formulated, as discussed under Standard 3.

Graduates' performance

The panel verified that the position of graduates of both programmes reflect that students achieve the ILOs. Many graduates of the bachelor's programme choose to continue their studies in a master's programme. The majority went on in the master's programme in Biology at Wageningen, some chose other WU programmes in related fields or continued their studies elsewhere in the Netherlands or abroad. Only a very small minority entered the labour market (XXX%). Graduates of the bachelor programme confirmed to the panel that they generally felt well-prepared for their further studies and did not encounter any particular problems in switching to the more advanced master's level.

After obtainment of a master's degree, many graduates of the programme find employment at non-profit organisations, are hired by companies involved in research or consultancy or continue in research at WU or other universities/research. The panel also studied the results of a labour market research from the Institute of Biology, dating back to 2018. In this research, 660 Biology graduates



(including 78 WU respondents) answered questions regarding their further career. From this research followed that a relative large proportion of WU graduates work in Ecology, Evolution, Environment & Sustainability and Agri & Food and Horticulture (27% versus 6% of all Dutch Biology graduates). A smaller proportion of WU graduates find a job in Life Sciences & Health (27% versus 52% nationally). This also translates to popular employers for WU graduates; companies, universities, research institutes and foundations are more likely to employ a WU graduate than university hospitals. These percentages seem, however, to be in line with the distribution of students across the specialisations of the master's programme and also reflect the strengths in WU research. The panel concluded that these outcomes suggest that WU graduates find employment that match the programme's profile and ILOs. Feedback from employers suggest that graduates of the master's programme have obtained the necessary skills and competencies to function well in their chosen careers.

Considerations

The panel verified at both programmes that the assessment system safeguards that students achieve all intended learning outcomes. This conclusion was also supported by the evidence gathered from studying a selection of final projects for both programmes, which reflected that graduates achieve the required degree level for a bachelor's or master's programme. At bachelor's level, the panel encountered one thesis that it considered rather weak. After studying some additional theses at the lower range of the passing grades, it was nevertheless convinced that the programme guarantees the degree level sufficiently and that students meet the required level. The quality of bachelor theses was generally adequate to very good. At master's level, the panel encountered some theses of exceptional good quality next to theses of sufficient to good level. It found the studied internship reports diverse, both in nature and in quality, but generally of adequate level with some positive exceptions. In addition, the performance of graduates of both programmes in their further studies and the entered career paths are further evidence that students achieve the intended learning outcomes.

Conclusion

Bachelor's programme Biology: the panel assesses Standard 4 as 'meets the standard'.

Master's programme Biology: the panel assesses Standard 4 as 'meets the standard'.

GENERAL CONCLUSION

The panel assessed standards 1, 2, 3, and 4 of the bachelor's and master's programme Biology as 'meets the standard'. Based on the NVAO decision rules regarding limited programme assessments, the panel therefore assesses both programmes as 'positive'.

Conclusion

The panel assesses the *bachelor's programme Biology* as 'positive'.

The panel assesses the *master's programme Biology* as 'positive'.

APPENDICES

APPENDIX 1: DOMAIN-SPECIFIC FRAMEWORK OF REFERENCE

Domeinspecifiek referentiekader bachelor Biologie 2020

Versie 12 februari 2020 (This is a version created by Biology at the WU based on the document send on 20 February 2020 to all biology programmes in the Netherlands)

Het domein van de biologie is het levende systeem en de interactie hiervan met de omgeving. De biologie onderzoekt op verschillende organisatieniveaus, die van moleculen, cellen, organismen, populaties en ecosystemen, een waaier van fundamentele vragen aangaande energie, zelforganisatie, emergentie van complexe eigenschappen, dynamiek en interactie, erfelijkheid, structuur en functie en evolutie. In elke opleiding Biologie moet de samenhang van al deze aspecten van het leven centraal staan. Biologie is inmiddels in staat de dynamiek van de bouwstenen van het leven en veel van de mechanismen die eraan ten grondslag liggen te doorgronden. Biologie is uitgegroeid tot een integratieve, verklarende en voorspellende wetenschap, mede door gebruik van kennis uit andere vakgebieden zoals wiskunde, natuur- en scheikunde, informatica en aardwetenschappen. Het begrijpen van de complexiteit van biologische systemen is naast een intellectuele ook een maatschappelijke uitdaging. In de afgelopen jaren is de biologie een steeds grotere rol gaan spelen bij het oplossen van maatschappelijke vraagstukken rond duurzame voedselvoorziening, gezond ouder worden, genezen van ziekten, behoud van biodiversiteit, groene energie en bio-based materialen en ontwerpen. Derhalve speelt de biologie in Nederland een sleutelrol bij het behouden en versterken van de sterke internationale positie op het gebied van voeding, gezondheid en duurzaamheid.

Biologen zijn gewenst in een steeds breder aanbod van posities. Dit stelt de opleidingen voor de taak om studenten voor te bereiden op een werkring in het fundamenteel onderzoek, maar ook in toegepast onderzoek en technologie, educatie, communicatie en beleid, zowel in de biologie als in de grensgebieden met andere wetenschappen. Biologen moeten, meer dan voorheen, om kunnen gaan met dynamiek, big data, data integratie en complexiteit op verschillende organisatieniveaus. Door goed ontwikkelde academische vaardigheden, zoals schriftelijk en mondeling rapporteren, kritisch kunnen lezen van vakliteratuur en kritische zelfreflectie, maar ook door het kunnen samenwerken in een team, planmatig werken en projectmanagement, kan de bioloog belangrijke bijdragen leveren zowel binnen als buiten de eigen discipline en in interdisciplinaire teams.

De opleiding Bachelor Biologie is een driejarige opleiding. De bacheloropleiding biedt een brede basis, met mogelijkheid tot verdieping in verschillende subdisciplines. Na afronding van de Bachelor Biologie zijn studenten in staat om een biologisch georiënteerde masteropleiding te volgen, of een functie op de arbeidsmarkt te verwerven in de richting van, bijvoorbeeld, educatie, advies, wetenschapsjournalistiek, beleid en management. Uitstroming naar het beroepenveld direct na de Bachelor is in Nederland echter nog ongebruikelijk.

Eisen van (internationale) vakgenoten en het beroepenveld

Biologie opleidingen kennen wereldwijd een lange traditie als kerndiscipline, waarbij in de loop van de jaren de aandacht verschoven is van het beschrijven naar het verklaren, waarbij het integreren en analyseren van verschillende (sub) disciplines en organisatieniveaus heel belangrijk is geworden. De opleiding Biologie beoogt studenten af te leveren die excelleren in hun specifieke vakgebied, maar ook een breed overzicht en brede samenhangende kennis hebben van algemene concepten en technieken. Studenten dienen daarom gedurende de bacheloropleiding voorbereid te worden op de keuze voor een masteropleiding.

De Biologie opleidingen in Nederland zijn verbonden in het Overlegorgaan Hoger Onderwijs Biologie (OHOB). In dit verband is overeengekomen dat studenten Bachelor Biologie vrijelijk en zonder aanvullende kosten, cursussen kunnen volgen bij de zusteropleidingen (binnen de hiervoor beschikbare vrije studieruimte). Ook is afgesproken dat afgestudeerde bachelor studenten in principe toelaatbaar zijn tot de masteropleidingen van de zusterinstellingen, mits zij voldoen aan eventuele aanvullende ingangseisen. De Nederlandse Bacheloropleidingen Biologie staan internationaal goed



aangeschreven. Studenten met een Nederlands diploma Bachelor Biologie zijn in principe toelaatbaar tot alle internationale biologische masteropleidingen.

Wat mag van een Bachelor Biologie worden verwacht?

Van de afgestudeerde mag worden verwacht dat deze:

1. Beschikt over vakgebonden kennis en vaardigheden.

De bachelor kan:

- a. centrale biologische concepten regulatie, zelforganisatie, interactie, communicatie, erfelijkheid en evolutie herkennen, beschrijven en, afhankelijk van de gekozen specialisatie, toepassen in de context van relevante vakgebieden binnen de biologie
- b. onderzoekstechnieken, laboratoriumvaardigheden en literatuur-onderzoeksvaardigheden toepassen in biologisch wetenschappelijk onderzoek. De bachelor heeft tevens kennis van kwantitatieve benaderingen waarmee grote en veelsoortige datasets verwerkt kunnen worden om tot een beter begrip van biologische systemen te komen en kan deze kennis in een onderzoeksomgeving toepassen.
- c. zelfstandig, maar onder supervisie, een biologisch onderzoek formuleren, opzetten, uitvoeren en de resultaten analyseren, interpreteren en presenteren.

2. Beschikt over academische en leervaardigheden.

De bachelor is in staat om:

- a. mondeling en schriftelijk te rapporteren over het bestudeerde vakgebied, zowel voor een publiek van specialisten als voor niet-specialisten.
- b. kritisch te reflecteren op eigen en andermans handelen in professionele context, om te handelen volgens de normen van wetenschappelijke integriteit, en om maatschappelijke en ethische consequenties van biologisch onderzoek te evalueren.
- c. samen te werken en planmatig te werken.

Domain-specific framework of the masters' programme in Biology

Version February 20, 2020 (This is a version created by Biology at the WU based on the document send on 20 February 2020 to all biology programmes in the Netherlands)

The field of Biology encompasses living systems and their interaction with the environment. Cutting across levels of biological organisation, spanning from molecules and cells to organisms, populations and ecosystems, biological research addresses questions pertaining to energy conversion and metabolism; interaction, communication, feedback and regulation; development and the emergence of complex structure; and heredity, function, evolution and bio-diversity. The coherence of these concepts and their role in the organisation and dynamics of life should, therefore, be the central themes in every Biology programme. Rapid progress in the characterization of the building blocks of life and the molecular mechanisms that lie at its basis, have transformed Biology into an explanatory and predictive science that is firmly integrated with other disciplines such as mathematics, physics, chemistry, informatics and earth sciences. A fundamental understanding of biological systems is indispensable for resolving major societal challenges, such as transitioning to sustainable food production, conserving bio-diversity, unlocking the potential of green energy and bio-based materials, healthy ageing and fighting disease. As these are projected key areas of global societal and economic development, Biology is vital to preserving and reinforcing the leading position of the Netherlands on the international stage.

In view of the rapid development of the biological sciences and the broad range of positions for which biologists are required, educational programmes must prepare biology students for jobs in fundamental research, applied research and technology, education, communication and policy; both in biology and at its interface with other disciplines. More than ever, biologists are required to be competent at integrating big data, dealing with dynamical systems and analysing complex networks of interactions, at multiple levels of biological organisation. Biologists work as specialist experts in

their own discipline and as part of broad multi-disciplinary teams. To function adequately in these contexts, students need to develop excellent academic skills in scientific writing, oral presentation, critical reading of the scientific literature, self-reflection, teamwork, project planning and time-management.

The MSc Biology covers a two-year programme, offering a deepening of knowledge in one or more biological sub disciplines in the fields of research, policy, management, communication or teaching. Next to the research specialisation, in each of the other specialisations at least one research project is incorporated. After completion of the masters' programme, students are well equipped to follow a biologically oriented PhD trajectory or to obtain other positions at the academic level related to biology.

Demands of (international) colleagues and the professional environment

Biology has a long and world-wide tradition as an academic core discipline. Over the course of this history, its educational programmes have shifted from emphasising descriptive science and specialised factual knowledge to explanatory research approaches that increasingly integrate across sub-disciplines and levels of biological organisation. The masters' programme aims to provide students with knowledge and skills in their specific domain and with general academic competences that will enable them to perform in an excellent manner in a broad range of professional environments. Students should be able to explain and reflect on their choice for a specialized PhD trajectory, or for another position in the labour market within the area of policy/administration, R&D, management, education or communication.

Dutch masters' programmes in biology have a good international reputation. The institutions offering a biologically-oriented MSc in the Netherlands participate in the 'Overlegorgaan Hoger Onderwijs Biologie' (OHOB; Consultative Body of Higher Educational Teaching in Biology). Students are allowed to take courses within the elective part of their master programme from other (Dutch) biology masters' programmes. Students with a Dutch masters' diploma can enter into all relevant international biologically-oriented PhD positions.

What can be expected from a MSc Biology?

1. Knowledge and research skills

The graduate:

- a) is able to make use of the conceptual framework of the discipline in which he/she has specialized in order to explain the state of the art of developing theories and to identify the most important research issues;
- b) can systematically solve scientific problems within the context of relevant biological fields;
- c) can apply and optimize research techniques in biological research under supervision;
- d) can formulate, initiate and execute a biological research project and analyse and interpret the results.

2. Academic and learning skills

The graduate:

- a) can report orally and in writing on the field of study for a specialist and a general audience;
- b) is able to critically reflect on the performance of him/herself and others in the professional context and to evaluate the societal and ethical consequences of biological research;
- c) can communicate effectively within the chosen field of specialisation.
- d) can collaborate in multidisciplinary teams and can manage projects
- e) is aware of the societal needs regarding biology and feels challenged to deal with them



APPENDIX 2: INTENDED LEARNING OUTCOMES

Bachelor's programme Biology

The bachelor's student can:

- understand the fundamental concepts and mechanisms in biology at a molecular, cellular, organismal, population and ecosystem level;
- apply basic knowledge of physics, mathematics, statistics and chemistry, and relate concepts at molecular, cellular, organismal, population and ecosystem level to solve biological problems (under supervision);
- analyse concepts, approaches and methods and reflect upon scientific biological literature;
- gather and interpret relevant data in the field of biology using standard research techniques such as microscopy, dissection, determination of organisms, molecular biological techniques, safe microbiological techniques, and modelling;
- be able to apply procedural knowledge by writing and carrying out a research plan in the field of biology including the main phases of a scientific research process;
- be capable of doing experiments, collecting data and simulating data in the field of biology (under supervision);
- be able to communicate (verbally and in writing) the outcomes of learning, experiments or project work to both specialists and non-specialists audiences, both in Dutch and in English;
- be able to make judgments based on social and ethical aspects of biological research and are able to recognize and analyse these aspects in concrete situation;
- design and plan own learning path (under supervision) based on continuous evaluation upon personal knowledge, skills and performance.

Master's programme Biology

The master's student can:

- critically discuss the latest scientific developments in the biological sciences at molecular, cellular, organismal, population and ecosystem level;
- analyse advanced and complex biological concepts, approaches and methods and reflect upon scientific biological literature;
- analyse the fundamental concepts and mechanisms in biology in the chosen specialisation;
- apply and evaluate state of the art research techniques in the field of biology;
- write, critically evaluate and adapt a research plan in the field of biology and carry out the research plan by doing experiments and/or collecting (field) data and interpreting the results;
- communicate and discuss convincingly project outcomes, methods and underpinning rationale to specialists and non-specialists audiences;
- take into consideration social, scientific and ethical aspects of biological research that are encountered in work or study in the field of biology;
- design and plan own learning processes based on continuous reflection upon personal knowledge, skills, attitudes and performance;
- adapt to a working environment in principle outside Wageningen University and critically reflect on their performance;
- cooperate as a specialist in a multidisciplinary, international team to solve a biological research questions or perform project-based work.

APPENDIX 3: OVERVIEW OF THE CURRICULUM

Bachelor's programme Biology

Year 1

Afternoon	Morning
Mathematics 1 or Statistics 1	"Ecology I" and "Ecology II"
Bio-organic Chemistry for the Life Sciences	September/October
Mathematics 2	Cell Biology
General Chemistry for the Life Sciences	November/December
Holidays	
Fundamentals of Genetics & Molecular Biology	Period 3
January	
Re-exams	
Evolution & Systematics	Period 4
February	
Human & Animal Biology	Structure & Function of Plants
March/April	Period 5
Biodiversity of the Netherlands	Period 6 A
May	
Mathematics 3	Physics for the Life Sciences
June	Period 6 B
Holidays	
Re-exams	
Holidays	

Year 2 A - Cell and Molecular Biology

Afternoon	Morning
"Reproduction of Plants" and "Academic skills for Biologists"	Human & Animal Biology, part 2
Microbiology & Biochemistry	Modelling Biological Systems
Holidays	
Biology of invertebrates, Algae & Fungi, part 1	Mechanisms of Development
Re-exams	
Practical Biological Chemistry	
Biology & philosophy; exploring open questions	Gene Technology
Animal Behaviour	
"Biology of Invertebrates, Algae & Fungi part 2" and "Statistics 2"	Genetic Analysis Trends & Concepts
Holidays	
Re-exams	
Holidays	

Year 3 A - Cell and Molecular Biology

Afternoon	Morning
Optional	Introduction to Bioinformatics
Cell Biology & Advanced Imaging Technologies	Optional
Holidays	
Optional	Optional
Re-exams	
Optional	Optional
Optional	Optional
BSc Thesis Biology (possible in another period)	
Holidays	
Re-exams	
Holidays	

Year 3 B - Organismal & Developmental Biology

Afternoon	Morning
Ecophysiology	Optional
Optional	Vertebrate Structure & Function
Optional	Optional
Holidays	
Optional	Optional
Re-exams	
Optional	Optional
Optional	Optional
BSc Thesis Biology (possible in another period)	
Holidays	
Re-exams	
Holidays	

Year 2 B - Organismal adaptation & development

Afternoon	Morning
"Reproduction of Plants" and "Academic skills for Biologists"	Human & Animal Biology, part 2
Microbiology & Biochemistry	Modelling Biological Systems
Holidays	
Biology of invertebrates, Algae & Fungi, part 1	Mechanisms of Development
Re-exams	
Practical Biological Chemistry	
Biology & Philosophy: exploring open questions	Concepts & Approaches in Developmental Biology
Animal Behaviour	
"Biology of Invertebrates, Algae & Fungi part 2" and "Statistics 2"	Plant Plasticity & Adaptation
Holidays	
Re-exams	
Holidays	



Year 2 C - Human & Animal Health Biology

Afternoon	Morning
Period 1 September/October "Reproduction of Plants" and "Academic skills for Biologists"	Period 1 September/October Human & Animal Biology, part 2
Period 2 November/December Microbiology & Biochemistry	Period 2 November/December Modelling Biological Systems
Holidays	
Period 3 January Biology of invertebrates, Algae & Fungi, part 1	Period 3 January Mechanisms of Development
Re-exams	
Period 4 February Practical Biological Chemistry	Period 4 February Practical Biological Chemistry
Period 5 March/April Biology & Philosophy: exploring open questions	Period 5 March/April Introduction to Human Immunology and "General Toxicology" or "Human Infectious Diseases"
Period 6 A May "Biology of Invertebrates, Algae & Fungi part 2" and "Statistics 2"	Period 6 A May "Biology of Invertebrates, Algae & Fungi part 2" and "Statistics 2"
Period 6 B June Behavioural Endocrinology	Period 6 B June Behavioural Endocrinology
Holidays	
Re-exams	
Holidays	

Year 3 C - Human & Animal Health Biology

Afternoon	Morning
Period 1 September/October Basics of Infectious Diseases	Period 1 September/October Optional
Period 2 November/December Optional	Period 2 November/December Nutritional Physiology
Holidays	
Period 3 January Optional	Period 3 January Optional
Re-exams	
Period 4 February Optional	Period 4 February Optional
Period 5 March/April Optional	Period 5 March/April Optional
Period 6 A May BSc Thesis Biology (possible in another period)	Period 6 A May BSc Thesis Biology (possible in another period)
Period 6 B June BSc Thesis Biology (possible in another period)	Period 6 B June BSc Thesis Biology (possible in another period)
Holidays	
Re-exams	
Holidays	

Year 3 D - Ecology & Biodiversity

Afternoon	Morning
Optional	Ecological Methods I
Optional	"Introduction Geo-information Science" or "Systems Analysis, Simulation & Systems Management"
Holidays	
Optional	
Re-exams	
Optional	
Optional	Optional
BSc Thesis Biology (possible in another period)	
Holidays	
Re-exams	
Holidays	

Year 2 D - Ecology & Biodiversity

Afternoon	Morning
"Reproduction of Plants" and "Academic Skills for Biologists"	Human & Animal Biology, part 2
Microbiology & Biochemistry	Modelling Biological Systems
Holidays	
Biology of invertebrates, Algae & Fungi, part 1	Mechanisms of Development
Re-exams	
Populations & Systems Ecology	
Biology & Philosophy: exploring open questions	Molecular & Evolutionary Ecology
Animal Behaviour	
"Biology of Invertebrates, Algae & Fungi part 2" and "Statistics 2"	Webs of Terrestrial Diversity
Holidays	
Re-exams	
Holidays	

Courses – all BBI students

Before starting with the BSc-thesis students must have completed at least 102 credits of CS and RO courses including all 60 credits of the B1 (more information on <https://ssc.wur.nl/Studiegids/Opleiding/BBI>). Student can either choose a minor, a BSc Internship Biology or own coherent set of optional courses. Students that want to orientate themselves on the job market can choose the BSc Internship Biology (YBI-70324) as part of their optional courses. Students should have completed their BSc thesis Biology prior to starting with their BSc Internship Biology.

	EC	CS/RO	Fase
Bio-organic Chemistry for Life Sciences	3.00	CS	B1
Ecology I	3.00	CS	B1
Ecology II	3.00	CS	B1
Mathematics 2	3.00	CS	B1
General Chemistry for the Life Sciences	3.00	CS	B1
Cell Biology	6.00	CS	B1
Fundamentals of Genetics and Molecular Biology	6.00	CS	B1
Evolution and Systematics	6.00	CS	B1
Human and Animal Biology I	6.00	CS	B1
Structure and Function of Plants	6.00	CS	B1
Mathematics 3	3.00	CS	B1
Physics for Life Sciences	3.00	CS	B1
Biodiversity of The Netherlands	6.00	CS	B1
Reproduction of Plants	3.00	CS	B2
Academic skills for Biologists	3.00	CS	B2
Human and Animal Biology, part 2	6.00	CS	B2
Microbiology & Biochemistry	6.00	CS	B2
Modelling Biological Systems	6.00	CS	B2
Biology of Invertebrates, Algae and Fungi	6.00	CS	B2
Mechanisms of Development	3.00	CS	B2
Animal Behaviour	3.00	CS	B2
Biology and Philosophy; Exploring Open Questions	3.00	CS	B2
Statistics 2	3.00	CS	B2
Skills portfolio for BBI	1.00	CS	B3
BSc Thesis Biology	12.00	CS	B3
Mathematics 1	3.00	RO1	B1
Statistics 1	3.00	RO1	B1
BSc Internship Biology	24.00	RO2	B3

A - Cell and Molecular Biology

	EC	CS/RO	Fase
Practical Biological Chemistry	6.00	CS	B2
Gene Technology	6.00	CS	B2
Genetic Analysis Trends and Concepts	6.00	CS	B2
Introduction to Bioinformatics	6.00	CS	B3
Cell Biology and Advanced Imaging Technologies	6.00	CS	B3

B - Organismal Adaptation and Development

	EC	CS/RO	Fase
Practical Biological Chemistry	6.00	CS	B2
Concepts and Approaches in Developmental Biology	6.00	CS	B2
Plant Plasticity and Adaptation	6.00	CS	B2
Ecophysiology	6.00	CS	B3
Vertebrate Structure and Function	6.00	CS	B3

C - Human and Animal Health Biology

The courses CBI20803, TOX20303 and VIR20803 will be scheduled in such a way that students can follow all three courses in periode 5 MO. RO1: choose at least 3 credits.

	EC	CS/RO	Fase
Practical Biological Chemistry	6.00	CS	B2
Introduction to Human Immunology	3.00	CS	B2
Behavioural Endocrinology	6.00	CS	B2
Basics of Infectious Diseases	6.00	CS	B3
Nutritional Physiology	6.00	CS	B3
General Toxicology	3.00	RO1	B2
Human Infectious Diseases	3.00	RO1	B2

D - Ecology and Biodiversity

RO1: choose at least 6 credits

	Ects	CS/RO	Fase
Population and Systems Ecology	6.00	CS	B2
Molecular and Evolutionary Ecology	6.00	CS	B2
Webs of Terrestrial Diversity	6.00	CS	B2
Ecological Methods I	6.00	CS	B3
Introduction Geo-information Science	6.00	RO1	B3
Systems Analysis, Simulation and Systems Management	6.00	RO1	B3



Master's programme Biology

The total nominal duration of the MSc programme is 24 months. During this period, (minimally) 120 ECTS-credit points have to be obtained. The exact composition of a study programme will differ from student to student and depends on the chosen specialisation, research interest, etc.

With respect to the elements to be included in a programme, the 'default study programme' includes:

- Compulsory MBI course: Frontiers in Biology (6 ects);
- Specialisations courses (total 12 ects);
- Major thesis (36 ects);
- Internship (24 ects);
- Academic consultancy training (9 ects) & Modular skills training (3 ects);
 - o Or Research master cluster (12 ects);
- Optional part / Free choice (30 ects).

Courses – all MBI students

	EC	CS/RO	Fase
Frontiers in Biology	6.00	CS	M1
Modular Skills Training	3.00	RO1A	M1/2
Academic Consultancy Training	9.00	RO1A	M1/2
Research Master Cluster: Proposal Writing	12.00	RO1B	M1/2
Laboratory Animal Science: Design and Ethics in Animal Experimentation	3.00	RO2	M1
Modelling Biological Systems II	6.00	RO3	M1/2
Advanced Statistics	6.00	RO4	M1/2
Data Science Concepts	6.00	RO4	M1/2
Statistics for Data Scientists	6.00	RO4	M1/2
Data Science for Ecology	6.00	RO4	M1/2
Data Science Ethics	3.00	RO4	M1/2
Data-Driven Discovery in the Life Sciences: Hypothesis Generation from Omics Data	6.00	RO4	M1/2

A - Cell and Molecular Biology

	EC	CS/RO	Fase
Control of Cellular Processes and Cell Differentiation	6.00	RO1A	M1
Genetic Analysis Trends and Concepts	6.00	RO1B	M1
Advanced Biosystematics	6.00	RO1A	M1
Cell Biology and Advanced Imaging Technologies	6.00	RO1A	M1
Molecular Aspects of Bio-interactions	6.00	RO1B	M1
Genomics	6.00	RO1A	M1
Immunotechnology	6.00	RO1B	M1

B - Organismal Adaptation and Development

	EC	CS/RO	Fase
Genetic Analysis Trends and Concepts	6.00	RO1B	M1
Life History of Aquatic Organisms	6.00	RO1A	M1
Advanced Biosystematics	6.00	RO1A	M1
Molecular Aspects of Bio-interactions	6.00	RO1B	M1
Regulation of Plant Development	6.00	RO1A	M1
Functional Zoology	6.00	RO1B	M1
Marine Animal Ecology	6.00	RO1A	M1
Plant-Microbe Interactions	6.00	RO1A	M1
Plant Plasticity and Adaptation	6.00	RO1A	M1
Behavioural Ecology	6.00	RO1B	M1
Developmental Biology of Animals	6.00	RO1B	M1

C - Human and Animal Health Biology

	EC	CS/RO	Fase
Human and Veterinary Immunology	6.00	RO1A	M1
Host-Parasite Interactions	6.00	RO1B	M1
Molecular Regulation of Health and Disease	6.00	RO1A	M1
Fundamental and Applied Virology	6.00	RO1A	M1
Commensal and Pathogen Host-Microbe Interactions in the Intestine	6.00	RO1A	M1
Immunotechnology	6.00	RO1B	M1
Brain, Hormones and Metabolism	6.00	RO1B	M1
Disease Ecology	6.00	RO1B	M1

D - Ecology and Biodiversity

	EC	CS/RO	Fase
Marine Systems	6.00	RO1A	M1
Microbial Ecology	6.00	RO1A	M1
Ecological Aspects of Bio-interactions	6.00	RO1B	M1
Advanced Biosystematics	6.00	RO1A	M1
Ecological Modelling and Data Analysis in R	6.00	RO1A	M1
Molecular Aspects of Bio-interactions	6.00	RO1B	M1
Biological Interactions in Soils	6.00	RO1B	M1
Complexity in Ecological Systems	6.00	RO1A	M1
Fisheries Ecology	6.00	RO1A	M1
Forest Ecology and Forest Management	6.00	RO1A	M1
Environmental Toxicology	6.00	RO1B	M1
Population and Quantitative Genetics	6.00	RO1A	M1
Marine Animal Ecology	6.00	RO1A	M1
Plant, Vegetation and Systems Ecology	6.00	RO1B	M1
Animal Ecology	6.00	RO1B	M1
Disease Ecology	6.00	RO1B	M1

APPENDIX 4: PROGRAMME OF THE SITE VISIT

Programma met deelnemers (bijgewerkt op 14 april)

9.00 – 9:45 Vooroverleg panel en inloopspreekuur
9.45 – 10:45 Overleg met deelnemers opleidingen Dean of Education, Programme director, study advisor Secretary examining board, Chairman examining board Two Teachers and members of the programme committee One Teacher and former member of the programme committee Two Students and members of the programme committee
10.45 – 11.15 Pauze
11.15 – 12.00 Overleg met docenten Three Teachers and members of the programme committee One teacher and former member of the programme committee Two additional teachers
12.15- 13.00 Overleg met studenten en Alumni 1. Student and member of the programme committee 2. Student and member of the programme committee Four additional students Two alumni
13.00 – 13.45 Pauze
13.45 – 14.15 Vaststellen bevindingen panel
14.15 – 15.00 evaluatie/afroning (publiek)



APPENDIX 5: THESES AND DOCUMENTS STUDIED BY THE PANEL

In preparation to the online assessment of the Biology programmes, the panel studied, the following documents:

- Governance of WU Degree Programmes (Wageningen education organisation matrix)
- Reference framework for all BSc Biology programmes in the Netherlands
- Reference framework for all MSc Biology programmes in the Netherlands
- Onderwijs en Examenregeling Wageningen University 2019-2020 (general) via: https://www.wur.nl/upload_mm/e/e/5/d1abd42f-d5ad-4141-b056-c8134a826ead_2019-2020_OER_BAMA_WU_NL_3.0.pdf
- Student statute 2019-2020 via: <https://www.wur.nl/nl/Onderwijs-Opleidingen/Huidige-Studenten/studentenstatuut-2019-2020.htm>
- Rules and Regulations Exam Boards Wageningen University via: https://www.wur.nl/upload_mm/8/e/2/d02241ad-6164-4130-a6e2-688e680f71b1_2019-2020%202_Regels_en_Richtlijnen_Excies_WU_def%20%282%29.pdf
- Website studyguides BBI and MBI: <https://ssc.wur.nl/Studiegids/Opleiding/BBI> and <https://ssc.wur.nl/Studiegids/Opleiding/MBI>
- BSc Biology learning outcomes and assessment
- MSc Biology learning outcomes and assessment
- Profile MSc Biology 2020-2021
- SWOT analyses by bachelor's and master's students
- Overview Staff Biology
- BBI program 2019-2020
- Booklet: Getting started MBI in Wageningen 2019-2020
- Bachelor course information on:
 - BIF-20306 Introduction to Bioinformatics
 - EZO-23306 Modelling Biological systems
 - GEN-20306 Molecular and Evolutionary Ecology
- Master course information on:
 - MAE-30306 Marine Animal Ecology
 - MOB-30306 Control of Cellular Processes and Cell Differentiation
 - YBI-37806 Frontiers in Biology
- Studyguide BSc Thesis
- Studyguide MSc Thesis
- Studyguide Internship
- Advice report working group Thesis 2020
- Advice report working group Internship 2019
- BBI Plans for enhancement 2015 and 2016
- MBI Plans for enhancement 2015 and 2016
- BBI & MBI Plans for enhancement 2017
- BBI & MBI annual report and year plan 2018-2019
- Annual reports FBE UK 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018
- Reports meetings Programme director, examining board and course coordinators
- Education Assessment Policy Wageningen University 2017
- Professional field committee report notes 2015, 2017 and 2019-2020
- Results labour market research NIBI 2018
- Code of Conduct for Foreign Languages

Theses

The panel studied 15 theses of the bachelor's programme Biology and 15 theses of the master's programme Biology. Of the bachelor's programme 4 additional theses were studied. The panel also studied some internship reports.

More information on the selected theses is available from QANU upon request.