NVAO • THE NETHERLANDS

INITIAL ACCREDITATION

WO-MASTER

DATA SCIENCE FOR FOOD AND HEALTH

Wageningen University

FULL REPORT

24 JANUARY 2022

Content

1 Peer review

The Accreditation Organisation of the Netherlands and Flanders (NVAO) determines the quality of a new programme on the basis of a peer review. This initial accreditation procedure is required when an institution wishes to award a recognised degree after the successful completion of a study programme.

The procedure for new programmes differs slightly from the approach to existing programmes that have already been accredited. Initial accreditation is in fact an ex ante assessment of a programme. Once accredited the new programme becomes subject to the regular review process.

The quality of a new programme is assessed by means of peer review. A panel of independent peers including a student reviews the plans during a site visit to the institution. A discussion amongst peer experts forms the basis for the panel's final judgement and the advisory report. The agenda for the panel visit and the documents reviewed are available from the NVAO office upon request.

The outcome of this peer review is based on the standards described and published in the limited NVAO Assessment framework for the higher education accreditation system of the Netherlands (Stcrt. 2019, nr. 3198). Each standard is judged on a three-point scale: meets, does not meet or partially meets the standard. The panel will reach a conclusion about the quality of the programme, also on a three-point scale: positive, conditionally positive or negative.

NVAO takes an accreditation decision on the basis of the full report. Following a positive NVAO decision with or without conditions the institution can proceed to offer the new programme.

This report contains the findings, analysis and judgements of the panel resulting from the peer review. It also details the commendations as well as recommendations for follow-up actions. A summary report with the main outcomes of the peer review is also available.

Both the full and summary reports of each peer review are published on NVAO's website www.nvao.net. There you can also find more information on NVAO and peer reviews of new programmes.

Because of COVID-19 temporary measures apply for this peer review.

2 New programme

2.1 General data

Institution	Wageningen University
Programme	MSc[1] Data Science for Food and Health
Variants	Fulltime
Degree	Master of Science
Tracks	None
Locations	Wageningen
Study load	120 EC[2]
Field of study	Multisectoral

2.2 Profile

Wageningen University (WU) aims to train students of the Master of Science in Data Science for Food and Health to become professionals who can bridge the gap between the domains of data science on the one hand and food and health on the other. The programme prepares students for a career in industry or academia. Graduates will be able to combine a thorough understanding of nutrition, consumer behavior and lifestyle with data science knowledge and skills. The proposed programme thereby answers to a demand from academia and the working field for *integrators*: professionals that can act as a linking pin between multiple disciplinary approaches. The programme is uniquely positioned in the Dutch educational landscape and has no comparable equivalent. The proposed programme will be offered by the only faculty of Wageningen University: the faculty of Agriculture and Environmental Sciences. In total more than ten Chair Groups will be involved in the curriculum.

2.3 Panel

Peer experts

- Prof. dr. Willem-Jan van den Heuvel (chair), Full Professor in Information Systems and Managing Director of the European Research Institute of Services Science (ERISS);
- Dr. Edwin Harris, Senior Lecturer in Statistics at Harper Adams University Department of Agriculture & Environment (United Kingdom);
- Dr. Monique van der Voet, Team Leader Life Science Data at Danone Nutricia Research;
- Marijn Nijssen (student), Master in Science, Business and Innovation, Free University of Amsterdam and Master in Health Care Management, Erasmus University Rotterdam.

Assisting staff

- Ikrame Faris MSc, secretary
- Reina Louw MA, NVAO policy advisor and process coordinator

Site visit (online)
24 January 2022

[1] In Dutch: wo-master
[2] European Credits

3 Outcome

The NVAO approved panel reaches a positive conclusion regarding the quality of the Master Data Science for Food and Health offered by Wageningen University. The programme complies with all standards of the limited NVAO framework.

The master programme in Data Science for Food and Health has established a challenging and interesting profile that will enable graduates to become *integrators* who can bridge the gap between the domains of data science and food and health. There is a high demand for specialists who are able to operate at the interface of these different disciplines. The intended learning outcomes are up-to-date and well aligned with (international) professional needs, demands and standards. Various stakeholders, notably representatives of the professional field, were involved in the process of developing the programme. The panel advises the programme to be attentive of the limited career opportunities in academia and to make domain-specific standards more explicit at the programme-level. It further recommends to safeguard continued and sustainable involvement of the professional field, for example by installing an Advisory Board.

Strong elements of the teaching-learning environment include the quality of the teaching staff, the didactic concept of *boundary crossing* and the design and content of the curriculum. The flexibility provided in the form of a personalized programme is also evaluated positively. The study guidance is appropriate for a master's degree and the programme offers state-of-the-art facilities that students can make use of during their studies. The panel recommends the programme to specify the entry requirements to increase transparency and facilitate the admission procedure. It also asks to be mindful of the increasing workload for the study advisor as a result of intensified individual student guidance and to invest further in community-building.

The programme has a sound and transparent system of student assessment in place, in which the Board of Examiners plays an important role in terms of assuring the quality of (final) examinations. The assessment policy of Wageningen University describes various measures for enhancing the reliability and validity of examinations. The panel advises to extend the forms of testing with portfolio-based assessments to also reflect the practical orientation of the programme.

Wageningen University proposes that the programme has a duration of two years (120 EC). The programme's management arguments concern the breadth and complexity of the programme as well as the content of the curriculum, which reflect the requirements of the professional field and the interdisciplinarity of the programme. The panel agrees that the qualifications the graduates should have in order for them to be competitive in the international academic job market, cannot be achieved in a programme of less than two years. The panel advises to grant the programme the right to offer a two-year master's programme (120 EC).

The panel is highly appreciative of the proposed programme MSc Data Science for Food and Health and is convinced of its potential. Therefore, the panel assesses the quality of the programme as positive.

Standard	**Judgement**
1. Intended learning outcomes	Meets the standard
2. Teaching-learning environment	Meets the standard
3. Student assessment	Meets the standard
Conclusion	**Positive**

4 Commendations

The programme is commended for the following features of good practice.

1. Expertise of teaching staff – The teaching staff is characterized by professionalism, enthusiasm and dedication. The staff members bring in a wide array of expertise from various disciplines. Their vast experience instils confidence in their ability to implement the programme.

2. Didactic approach – Given the (interdisciplinary) character of the programme, the didactic concept of *boundary crossing* is considered highly appropriate and suitable.

3. Involvement professional field – Representatives of the professional field were involved in designing the new programme, both in terms of its goals, ambitions and content. Their involvement contributed to the refinement of the graduate profile.

4. Personalized programme – The flexibility provided within the programme gives students the opportunity to define and tailor the curriculum according to their interests and personal ambitions.

5. Societal and scientific need – The programme addresses an important societal and scientific need in the fields of data science and food and health. The panel compliments the programme´s integrated approach and considers it timely and much needed.

6. Available facilities – The programme offers state-of-the-art facilities that students can utilize at various moments during their study.

5 Recommendations

For further improvement to the programme, the panel recommends a number of follow-up actions.

1. Career opportunities – Inform students of the limited career opportunities within the academic world to manage expectations.

2. Domain-specific standards – Incorporate domain-specific standards at the programme-level, in addition to individual courses.

3. Involvement of the professional field – Safeguard continued and sustainable involvement of the professional field, for example by installing an Advisory Board.

4. Entry requirements – Specify the entry requirements to increase transparency and to facilitate the admission procedure.

5. Workload study advisor – Remain attentive to a possible increase in the workload of the study advisor.

6. Community-building – Keep investing in community-building activities for students of the programme.

7. Project-based assessment – Include project-based assessment to the testing forms to reflect the practical orientation of the programme.

6 Assessment

6.1 Standard 1: Intended learning outcomes

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

Judgement
Meets the standard.

Findings, analysis and considerations
The main objective of the master programme Data Science for Food and Health Students is to train students to apply data science techniques on the domains of food and health, specifically on the areas of lifestyle, consumer behaviour, nutrition and preventive health. The master programme is interdisciplinary by nature and reflects the ambition of Wageningen University & Research (WUR) to utilize the potential of increasing digitalization. This vision on the role of data science is also manifested in the founding of the Wageningen Data Competence Center (WDCC). The design of the programme is based on three principles: the context of WUR, the needs and demands of the professional field and the targeted group of students. Students learn to translate raw data from diverse sources into intelligible and actionable knowledge, using smart data processing and analytical methods. This enables them to create data-driven interventions and solutions for social partners, companies and policy makers in the food and health sector.

The envisioned graduate profile is defined as the *pi-shaped integrator:* professionals who can integrate data science knowledge and skills with a sound understanding of nutrition, consumer behaviour and lifestyle. By acquiring a solid foundation in both disciplines, complemented by excellent connecting skills, graduates will be able to act as intermediaries that can bridge the gap between two worlds. From the application file and online discussions, the panel found that this specific profile was based on thorough labour market research and consultations with representatives from the professional field. Thus, the panel is of the opinion that the need for an integrator profile is echoed by labour market demands and as such fulfills an important societal need. For the small minority of graduates that is expected to pursue a career in academia, the panel asks the programme management to be mindful that career opportunities within the academic world are limited[3]. Students should be made aware of this.

The panel gathered from the discussion with programme representatives that the individual learning trajectories lead to somewhat distinctive graduate profiles. It therefore asked whether it is possible to disclose information on the specific orientation of a student to increase transparency towards future employers. The Board of Examiners understands this request, but explains that university policy restricts including additional information on diploma certificates.

The profile of the programme has been translated into 10 intended learning outcomes (ILOs) that are connected to the four learning trajectories within the programme, including personal leadership. These learning outcomes are constructed in a matrix, matching individual courses and the programme. The panel has established that the intended learning outcomes are in line with Dublin descriptors at master level as well as other (inter)national scientific and domain-specific standards. Such standards include the Dutch ´Criteria for Academic Master´s Curricula´, the Institute of Electrical and Electronics Engineers (IEEE) and the EDISON framework. The panel initially questioned the broadness of certain learning outcomes, but learned that these were carefully constructed to reflect the ambition of delivering broadly-oriented intermediaries. With regard to domain-specific standards, the panel recommends to not only reflect these in individual courses but also on the programme-level.

The panel was pleased to establish that representatives of the professional field were involved in the process of developing the programme. During the online visit, it spoke with a delegation of representatives from the public health sector as well as the commercial sector. The involvement of the working field consisted of input with regard to the graduate profile, based on own experiences and labour market developments, and assessment of

[3] https://www.nature.com/articles/528007a

the curriculum. The representatives have expressed confidence that the programme will contribute to a graduate profile that is well-aligned with (international) professional needs and demands. The panel shares this view and commends the role of the involved actors. The panel advises the programme to safeguard continued and sustainable involvement of the professional field, for example by installing an Advisory Board. This will aid in adjusting the programme to evolving needs within the sector.

Based on the online discussions and the materials presented, the panel finds that the new MSc programme in Data Science for Food and Health presents an interesting and well-balanced set of intended learning outcomes that corresponds with the intended graduate profile. It recommends making the domain-specific standards more explicit at the programme-level. The professional field was adequately involved in the development of the programme and helped to refine the eventual graduate profile. The panel recognizes the importance and relevance of the *integrator* profile to societal and scientific challenges and developments. It did advise the programme management to be attentive to the limited opportunities within academia. In sum, the panel concludes that a promising programme, with a challenging and inspiring profile, has been developed that will enable graduates to be of added value in the labour market. As a whole, the panel concludes that this standard is met.

6.2 Standard 2: Teaching-learning environment

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

Judgement
Meets the standard.

Findings, analysis and considerations
The MSc Data Science for Food and Health is a two-year full-time programme of 120 EC. The curriculum design aims towards the achievement of the graduate profile of the pi-shaped integrator. Two instruments were used in the design of the programme to support this profile: the didactic philosophy of *Boundary Crossing* and a curricular framework of *learning trajectories*. The didactic concept of boundary crossing is centered around the idea that it is beneficial to work outside one's own scientific domain, institute, culture or context. From this stems that the different nature of disciplines, in this case data science and the domains of food and health, should be considered an opportunity rather than a constraint. It further implies that diversity in student influx is favourable to ensure effective peer-learning.

The panel is charmed by the didactic philosophy and recognizes its potential with regard to interdisciplinary teaching. The panel also comprehends the wish to attract students from a wide array of backgrounds, but raised concerns on the absence of clear admission requirements. The documentation provided by the university mentions that two types of students are eligible for admission into the programme: (1) students with a background in the domain of Food and Health who have affinity with data science, and (2) students who have a bachelor degree in informatics, computer science or data science and want to learn to apply their knowledge within the food and health domain. However, the way affinity with data science is measured was not substantiated. Also, students who lack knowledge of the food and health domain are advised to take Massive Open Online Courses (MOOCs), but the panel has reservations regarding the efficacy and the tailoring of these courses towards the programme. In the online discussion, it was explained that all applications will be carefully reviewed by an Admission Committee on a case-by-case basis. This working method is also applied in several other programmes of WU. If the Committee determines that a student is not directly admissible, an individually constructed transition programme of maximum 30 EC will be advised. Although the panel is confident that the admission procedure will be carried out carefully, it finds the proposed modus operandi rather time-consuming. It therefore advises to specify the admission requirements to facilitate the assessment procedure. Also, in view of student recruitment, clarity and transparency on admission criteria is highly recommended.

Four learning trajectories form a common thread through the curriculum, namely (1) data science, (2) food and health, (3) integration and (4) research. The learning trajectories are integrated in all courses and are connected to the learning outcomes. The five compulsory courses, offered in the first year, provide a sound basis in data science concepts and techniques and the application thereof on the domains of Food and Health. Two of these

courses, *Academic Consultancy Training* and *Data Science Ethics*, are practically-oriented and focus on problem-solving skills, communication skills as well as cooperative skills. The importance of personal development is reflected in the possibility to define an individual learning pathway, amongst others, in the personalized programme (18 EC). The programme is devised together with the study advisor with the aim to complement a student´s knowledge and skills by exploring a new field of expertise. Furthermore, preparatory courses for the thesis are offered.

The panel values the learning trajectories as a unifying element that connects all programme components. It initially questioned whether the compulsory courses were of sufficient profundity, but the online discussion clarified that given the diversity in the background of students some courses are of an introductory level in order to acquaint students with a new domain. The panel is also appreciative of the flexibility provided within the programme and the possibility for students to define and tailor the curriculum according to their interests and personal ambitions. The panel did, however, express concerns on possible misuse of this freedom by designing programmes that play to the strength of a student. The discussion with programme representatives clarified to the panel that the process of developing a personalized programme is well-structured and closely guided by the study advisor. Courses are carefully selected to ensure that the programme is complementary to the educational background of a student and the Board of Examiners is required to approve every individual personalized programme. The panel is reassured that this process mitigates the risk of irregularities.

The second year of the programme is devoted exclusively to the internship (24 EC) and thesis (36 EC). The duration of the internship is four months and allows students to reflect on the role of integrator in a working environment. The panel noted that the time span of four months is relatively short and recommends to extend this period to six months. The representatives of the professional field echoed this call in the online discussion. Programme representatives explained that the set-up of the second year is guided by university policy and harmonized for all programmes. Therefore, it cannot be altered. They did explain that in practice a duration of six months for internships is customary. In addition, they confirmed that internships can be done abroad. The programme is concluded with a master thesis, which enable students to realize their academic profile and prepare for their future careers through integrated research. The thesis may be carried out at the university or at a company. The panel positively evaluates the set-up of the thesis.

The programme offers the necessary support and study guidance for students. A particularly important role is reserved for the study advisor, who is closely involved in composing the personalized programme in consultation with students. The panel gathered from the discussion with the study advisor that prior to the start of the academic year a personal meeting is organized with all new students to devise a suitable personalized programme. The panel determined that the development of an individual learning trajectory is an intensive process and, although it is appreciative of the efforts to offer individual guidance, concerns were expressed with regard to a possible increase in the workload for the study advisor. The panel advises the programme management to remain attentive to this potential risk.

Since all students follow distinctive trajectories, community-building is of great importance to strengthen student bonding with the programme. The study advisor explained that in addition to regular information sessions, students can join the campus-wide study association and can draw on other (university-wide) activities. The panel also suggests to use Brightspace as a communication channel. As a whole, the panel finds the level of study guidance appropriate for a master degree.

The panel considers the programme management and teaching staff well-equipped to implement and coordinate the programme. All dedicated academic staff members have a solid background in data science and/or the domains of food and health. The teaching staff is systematically trained in their teaching and assessment skills through the University Teaching Qualification (UTQ). By now, the teaching staff is fairly experienced with adaptations in teaching and assessment as a result of the COVID-19 pandemic. The panel was impressed by the academic background and the enthusiasm of the teaching staff, who seem very invested in making this new programme work and have a shared vision on the teaching-learning environment. The panel knows periodic meetings were held in the development of the programme and would encourage the teaching staff, the programme management and the Programme Committee (PC) to continue these meetings to ensure further alignment of the various curriculum components.

The language of instruction is English. The programme management substantiates this choice by arguing that the profile of the programme and the internationally diverse influx of students who will be working as integrators in a global labour market, necessitate an English-taught programme. The teaching staff has sufficient command of the English language. The panel supports the considerations of the management and finds the name of the programme equally appropriate.

Since the assessment was conducted online, the panel was unable to have a tour of the facilities. Instead, it was provided with a description of the facilities in the application file. Particularly impressing are the available data science facilities. In addition to computing facilities at individual chair groups, Wageningen University & Research offers a High Performance Computing (HPC Annuna) facility for data processing tasks that require large storage demands. Based on the information provided, the panel determines that the proper infrastructure is in place to provide students with a stimulating learning environment.

In sum, the panel is convinced that the programme offers a strong teaching-learning environment. The didactic approach, content of the curriculum and high quality of the teaching staff are impressive and will enable incoming students to achieve the intended learning outcomes. The study guidance and available facilities are adequate and appropriate. To further improve the teaching-learning environment for students, the panel has shared suggestions with regard to the entry requirements, the role of the study advisor and community-building. Overall, the panel judges this standard as met.

6.3 Standard 3: Student assessment

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

Judgement

Meets the standard.

Findings, analysis and considerations

The system of assessment of the master programme Data Science for Food and Health is guided by the institution-wide education assessment policy. This document stipulates the university´s vision on assessment, the assessment practice and the actors and processes involved in the quality assurance of assessments. Elements of this policy are also part of the university-wide Education and Examination Regulations, which was reviewed by the panel. One of the most important principles of the assessment policy is constructive alignment, which entails that the level and methods of assessment are in line with the course's learning outcomes, the phase in the study programme and the teaching methods and learning activities. The relationship between the assessment methods of individual courses, both summative and formative, and the intended learning outcomes are visualized in a matrix. The panel considers the assessment policy of Wageningen University & Research and its translation to the programme sound and clear.

From the concept of constructive alignment follows that a wide variety of assessments is employed. The programme makes use of closed and open book tests, papers, project reports, oral exams and group project assignments. According to the BoE, there is no fixed ratio between individual and group assessments. The type of assessment differs depending on the nature of the course components and their learning objectives. For example, all compulsory courses contain group work to build collaborative skills. To reduce the risk of free-riding individual contribution in group work is also assessed. Finally, the BoE explained that soft skills, such as communication and consultancy skills, are assessed in several courses of the first year. These include *Data Science for Health: Principles* and *Academic Consultancy Training.* The panel is positive about the (mix of) assessment methods, but advises the programme to also consider assessment methods specifically accessible to data science industry roles, such as portfolio-based assessments (for example GitHub) to reflect the practical orientation of the programme and to be shown to potential employers.

For the assessment of internships and theses university-wide rules apply that are set out in several (policy) documents. Standardized assessment forms and rubrics are used for both the internship and the thesis. The examiner of Wageningen University & Research is responsible for the final assessment of the internship whilst the external supervisor fulfils an advisory role. The assessment is based on (a) an evaluation of the performance of

the student by the internship supervisor, (b) an evaluation interview between the student and the examiner, and (c) two reports. The two reports respectively contain an account on the internship results and a reflection on the internship itself and the student´s personal and professional development. The quality of the thesis is based on four criteria: (1) research competence, (2) the thesis report, (3) the oral presentation and (4) the oral defense. These criteria are assessed consistently and in detail using a thesis assessment form, focusing on competence in the application domain, as well as application of data science techniques and the integration of those two disciplines. Given the interdisciplinarity of the programme two research groups from within the university are involved in the assessment. The panel has reviewed the assessment forms and rubrics for the internship and thesis prior to the online visit. Although the panel has no objections to the use of standardizes forms, it did ask whether the assessment form of the thesis could be customized to include programme-specific elements. The BoE clarified that because the forms were introduced very recently, modifications were not likely in the short term. It also pointed out that the existing forms already provide room to add programme-specific information. The panel is pleased that this option is available.

Validity, reliability and transparency are enhanced in several ways, for example by reviewing examinations beforehand by a different staff member, by using clear assessment criteria for graded assignments in the form of rubrics and by providing clear information on examinations in matrices, course descriptions and courses guides. The panel is positive that these procedures safeguard high quality in assessment.

The master programme in Data Science for Food and Health will fall under the responsibility of the existing Board of Examiners Technology and Nutrition. From the discussion with the BoE, it became clear that it reviews courses offered by chair groups rather than individual programmes. In order to ensure alignment with the programme, regular meetings with the Programme Committee are organized. The BoE also confirmed to the panel that it was involved in the development of the programme. In the summer a meeting with different stakeholders was organized to discuss the individual courses in relation to the learning outcomes. The exams and rubrics for existing courses have been assessed by the Board. The courses that have yet to be developed will be assessed at a later stage. The BoE has ascertained that the programme as a whole meets master level requirements, but explains that some courses offered in the personalized programme are of an introductory level in order to acquaint students with a new field of expertise. The panel is satisfied with the involvement of the BoE in the development of the programme.

The panel concludes that the master programme has a sound and transparent system of assessment in place. It is characterized by a clear vision on assessment, which is translated in several (policy) documents. There is a wide variety of assessment methods and validity, reliability and transparency are guaranteed by several procedures. The panel advises to add portfolio-based assessment to broaden the assessment methods. The panel established that the BoE has the necessary level of independence, fulfills it tasks in line with its statutory duties an important role in ensuring assessment quality. Therefore, the panel judges this standard as met.

6.4 Degree and field of study

The panel advises awarding the following degree to the new programme: Master of Science
The panel supports the programme's preference for the following field of study: Multisectoral

6.5 Programme extension

Wageningen University proposes that the master programme Data Science for Food and Health has a duration of 2 years. The faculty management gave arguments concerning the breadth and complexity of the programme and the content of the curriculum, reflecting the requirements of the professional field.
The panel has assessed the arguments, using the criteria put forward in the Protocol for programme extension of NVAO, published on 8 October 2003.

Findings, analysis and considerations

The panel is of the opinion that the programme has convincingly shown that the two-year curriculum is designed to allow for fulfilment of the ILOs. The professional field demands a combination of technical education with knowledge on the food and health domain. The panel notes that master programmes in engineering, science and technology generally have a duration of two years. Related programmes at Wageningen University also have a

two-year curriculum. The panel strongly feels that the qualifications graduates should have in order for them to be competitive in the (inter)national job market cannot be achieved in a programme in less than two years.

Conclusion
Given these strong arguments in favour of a two-year curriculum, the panel advises to grant Wageningen University the right to offer a two-year master programme (120 EC).

Abbreviations

EC	European Credit
IEEE	Institute of Electrical and Electronics Engineers
ILO	Intended Learning Outcomes
MOOCs	Massive Open Online Courses
MSc	Master of Science
NVAO	Netherlands Flanders Accreditation Organisation
PC	Programme Committee
UTQ	University Teaching Qualification
WDCC	Wageningen Data Competence Center
WU(R)	Wageningen University (& Research)

The full report was written at the request of NVAO and is the outcome of the peer review of the new programme MSc Data Science for Food and Health of Wageningen University & Research

Application no: AV-1112

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