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Bachelor Agrotechnologie
Master Biosystems Engineering

Wageningen University

Advisory report of the assessment of the existing programmes

21 January 2025

Colophon

Institution and programmes

Wageningen University
Institutional Audit: yes

Bachelor's programme Agrotechnologie (Croho 56831)
Master's programme Biosystems Engineering (Croho 66831)
Location: Wageningen
Mode: full-time

Assessment panel

Stanley Brul, chair
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Summary

On 21 January 2025, the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering of Wageningen University were assessed. The panel's overall judgement of the two programmes is positive.

Intended learning outcomes

The bachelor's programme Agrotechnologie is a multidisciplinary programme that focuses on the needs of humanity in terms of sustainable food, feed, fuels, fibres, and chemicals. Students learn to investigate, develop, and combine knowledge and methods from technical sciences with biological, environmental, agricultural, and social sciences. The profile is translated into nine intended learning outcomes.

The master's programme Biosystems Engineering is a logical continuation of a bachelor's programme in Agrotechnology. The emphasis of the programme is on acquiring in-depth knowledge, integrating knowledge, and the development of innovative technology and systems for a biobased society. The programme has seven thesis tracks. The profile is translated into 16 intended learning outcomes. A separate intended learning outcome is included for each thesis track.

Both programmes are demonstrably unique within the Netherlands; they are clearly distinct from other programmes. The panel welcomes the multidisciplinary and systematic approach to science and engineering of both programmes. The intended learning outcomes of the two programmes fit the level and orientation of the programmes and are aligned with the expectations of the (international) professional field. There is sufficient differentiation between the intended learning outcomes of the bachelor's programme and those of the master's programme.

The panel thus concludes that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Teaching-learning environment

The Dutch-language fulltime bachelor's programme has a duration of three years and comprises a total of 180 EC. The programme has a large common part, providing the students with a broad basis in mathematics and physics, life sciences, social sciences, and a number of engineering disciplines. The first two years include mostly compulsory courses. The first year includes introductory courses. The second year contains broadening and deepening courses. The third year consists of free choice and the thesis.

The English-language fulltime master's programme has a duration of two years and comprise a total of 120 EC. The programme builds on the broad basis of students and goes more in depth, addressing the complexity and the challenges when technology and organic products meet. The programme has a small common part in which students further develop their skills in modelling, design, and quantitative assessment of technical innovations of biosystems. This common basis is followed by specialisation in tracks containing specific courses, and a thesis project.

The contents of the two programmes enable students to achieve the intended learning outcomes. The bachelor's programme and the master's programme have clearly translated the intended learning outcomes into the educational programmes.

The didactic concept of the programmes supports the learning process of the students. The educational formats are adequate. The study of the programmes consists of lectures, working lectures (making assignments under the guidance of a lecturer), practica (practical assignments in a lab room) and self-study.

The programmes have a strong teaching team. The various disciplines are well represented by the input of staff from a variety of research groups, as is practical and scientific experience in the various fields of work. From the start until the end of the bachelor's and master's programmes, pro-active and upon request personal guidance is provided by study advisors.

The admission requirements of both the bachelor's programme and the master's programme adequately match the programmes.

The panel thus concludes that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Student assessment

The programmes have an adequate, solid assessment system and assessment procedures. The system is adequately based on the university wide policy. Frequently used assessment forms are written exams (open and/or closed questions), oral exams (individual and with two students), practical performance (individual and group), reports or other written (group) assignments and (oral) presentations.

Quality assurance of assessment is ensured by a proactive Examination Board for the programmes. The board, focusing on a group of programmes, show a sufficient knowledge of the individual programmes and its assessment. In the past years, the capacity of the Board is sufficiently increased.

The panel thus concludes that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Achieved learning outcomes

Students complete their bachelor's programma with a thesis (24 EC). The intended learning outcome on working in a team is assessed in several courses. The intended learning outcomes on critically evaluating and making judgments are assessed in several courses.

After the bachelor's programme, students have access to several master's programmes. The bachelor's programme leads directly to the master's programmes Biosystems Engineering, the master's programme Biobased Sciences and the master's programme Development and Rural Innovation. Besides the programmes to which students have direct access, there are some opportunities to move on to other master's programmes.

With the master's programme thesis (36 EC), the programmes aim to assess most of the intended learning outcomes. The other learning outcomes are assessed elsewhere in compulsory courses. Working in an interdisciplinary team is for example assessed in the Research Master Cluster.

With the thesis, students show they are able to independently conduct a research project,

which includes among other activities the development of a research plan, collecting data, analysing data and reporting on the research.

A total of 234 alumni graduated in the past six years. One-third of alumni is working in Research and Development in a company. Furthermore, some of the group works in research and teaching, as data analysts, software engineers, as consultants or in sales.

Based on reviewing the recent theses of fifteen alumni from each programme, the panel finds that the students achieve the intended level of the programme in the subject area. The programmes prepare students well for the job market and that students end up in positions that fit the intended exit profiles.

The panel thus concludes that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Suggestions

Looking ahead, the panel offers several suggestions for consideration, including the following recommendations:

- Pay attention to the design of assessment forms and their expected completion, to ensure alignment with the intended learning outcomes to be assessed and make the rationale for judgements transparent, especially for the thesis.
- Explore the possibilities to implement new facilities for education, such as physical models instead of only digital computer models.
- Implement a more mature central policy around the teachers' and students' use of AI, focussing not only on the limitations, but also on the possibilities of AI.
- For the bachelor's programme, make sure that in your explanation of the programme's profile, a clear link is made to the title 'Agrotechnology'. A reference to this term would also be appropriate in the intended learning outcomes.
- For the bachelor's programme, clearly define where students should be able to communicate in English and translate this proportionally in the assessment.
- For the master's programme, monitor whether sufficient information is offered to students about their future job opportunities and whether sufficient attention is paid to the practical side of the study. If necessary, expand the amount of information on this in the programme.

All standards of the NVAO framework have been positively assessed. On this basis, the panel provides a positive recommendation regarding the accreditation of the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering.

On behalf of the entire site visit panel,
Utrecht, March 2025

Stanley Brul
Chair

Linda van der Grijspaarde
Secretary

Introduction

Profile

Wageningen University & Research is a collaboration between Wageningen University and the Wageningen Research foundation. The domain of Wageningen University & Research consists of three related core areas: Food, feed & biobased production, natural resources & living environment, and society & well-being. The mission of Wageningen University & Research is 'to explore the potential of nature to improve the quality of life.' Wageningen University & Research has 7,600 employees and 13,100 students.

Wageningen University & Research consists of one faculty, 5 departments and 95 chair groups. By 2023, there were 20 bachelor's programmes, 31 master's programmes and 49 Massive Open Online Courses.

Two programmes of Wageningen University are assessed: the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering.

The master's programme Biosystems Engineering is offered in English. Ever since the establishment of the bachelor's and master's programme's system, English has been the language of instruction for all master's programmes at Wageningen University. It is a condition for a basic principle of education at Wageningen University: the 'international classroom.' The language of English is defined in the Code of Conduct of the Wageningen University. With this policy, Wageningen University not only aims to ensure that students from all over the world can participate in the instruction and share its knowledge; it also aims to endow graduates with a basic skill that will help them to launch their (international) careers. The panel considers this an adequate explanation. In this respect, the panel finds it logical that the English-language programme has also chosen a corresponding English title.

The assessment

Wageningen University has commissioned AeQui to conduct the current assessment. For this purpose, AeQui, in collaboration with the programme, has assembled an independent and knowledgeable panel. A preparatory meeting with representatives of the programme has taken place.

The assessment was conducted based on the Accreditation Framework for Higher Education in the Netherlands, according to the programme outlined in Appendix 2. The institution has a positive institutional audit decision, and therefore four standards were assessed.

Recommendations for further development were made during the previous assessment. The programme has acted in response (see Appendix 3). The panel has integrated this follow-up into its considerations for the current assessment.

The panel conducted the assessment independently; the panel received the necessary information to arrive at a judgement. At the end of the assessment, the programme was informed of the findings and conclusions.

This report was sent in draft to the programme; the programmes responses have been incorporated into this final report.

At the initiative of the programme, a development meeting took place during the visit. The results of this development meeting did not affect the assessment presented in this report.

Intended learning outcomes

Standard 1: 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

For the individual programmes, the profile and intended learning outcomes are described. The link with the professional field is then described for the programmes together.

Bachelor's programme Agrotechnologie

The bachelor's programme Agrotechnologie is a multidisciplinary programme that focuses on the needs of humanity in terms of sustainable food, feed, fuels, fibres, and chemicals. It addresses challenges arising in systems or a chain of systems containing living organisms and products that are perishable, ripening, and subject to decay. So, students learn to investigate, develop, and combine knowledge and methods from technical sciences with biological, environmental, agricultural, and social sciences. Students also learn how to work in teams and to communicate effectively.

The bachelor's programme as well as the master's programme distinguish themselves from programmes at other universities (like mechanical engineering) by their strong emphasis on the agri-food chain: living organisms and perishable products that ripen and decay. Non-linear dynamic responses to environmental factors, uncertainty in system inputs (e.g. weather, consumer demand, prices) and inherent variability within natural produce are some of the complexities of biosystems. In other ways, the programmes are similar to engineering programmes at other technical universities in the Netherlands; these similarities are found in the systematic approach to science and engineering.

The profile of the bachelor's programme is translated into nine intended learning outcomes.

Master's programme Biosystems Engineering

The master's programme expands and deepens the learning outcomes of the underlying bachelor's programme. The objective of the master's programme is to educate academic professionals who are able to solve technology related problems in the field of biosystems engineering. Biosystems Engineering investigates, develops, and combines technical sciences with environmental, agricultural, life and social sciences. The emphasis of the programme is on acquiring in-depth knowledge, integrating knowledge, and the development of innovative technology and systems for a biobased society. Typical problems in protected cultivations are for example efficient organisation and transport of plants or products in a greenhouse, energy management, light management, or management of the indoor climate. The students are introduced to technology development and engineering of systems for a biobased society, the design of innovative biosystems, and the quantitative evaluation of these innovative biosystems. The students are also trained on consulting on an academic level and working in a multidisciplinary team.

The programme has seven thesis tracks. The seven available tracks are: Biobased Chemistry and Technology; Environmental Technology; Farm Technology; Geoinformation and Remote Sensing; Information Technology; Mathematics,

Systems and Control; and Operations Research and Logistics.

The profile is translated into 16 intended learning outcomes. A separate intended learning outcome is included for each thesis track.

Link with the professional field

To match the demands of the field, the programmes maintain formal and informal contacts with potential employers. In addition to the frequent contacts and meetings of staff with representatives of the professional field, an External Advisory Committee (Werkveld-commissie Biosystems Engineering) meets annually to discuss the intended learning outcomes, the content and quality of the programme and the performance of graduates of both programmes. From the documentation, the panel notes that the committee last met in March 2024. Discussions included current issues within the programmes. The future of the curriculum and the role of mechatronics within the programme were discussed.

Considerations

The panel believes that biosystems engineering is a particularly strong and internationally visible discipline at Wageningen University. Both programmes are demonstrably unique within the Netherlands; they are clearly distinct from other programmes. The panel welcomes the multidisciplinary and systematic approach to science and engineering of both programmes.

The panel agrees with the programmes that they could improve the attractiveness of the programmes, to attract more students. In doing so, the panel advises to be more specific on the profiling of both programmes and work out clearly what is meant by the broad term 'biosystem'. The cover letter, written for the review, already makes a good start in this respect, according to the panel. Based on the interviews with current students, especially the bachelor's programme has been successful to communicate that this program is not intended for students who see their future career as farmer. While this may limit attraction of some target audience, clarity on the programme's (engineering) objectives is of prime importance to manage putative student's expectations.

The panel assesses that the intended learning outcomes of the two programmes fit the level and orientation of the programmes and are aligned with the expectations of the (international) professional field. According to the panel, there is sufficient differentiation between the intended learning outcomes of the bachelor's programme and those of the master's programme. The latter are clearly formulated at a higher level.

The panel appreciates the programme's good contacts with the professional field. The programmes align their objectives and curricula with the professional field through informal contacts with stakeholders and annual consultations of their 'Werkveldcommissie'. The panel notes that the programme's good relations with the professional field enable it to continuously monitor current developments and incorporate them into the programme's profile and programme.

Regarding the bachelor's programme, the panel notes the following. The intended learning outcomes are in line with the multidisciplinary profile of the programme. There is sufficient attention to research skills, underlining the research-based nature of the programme. The focus on building teamwork skills is good. The panel appreciates the attention to quantitative modelling techniques.
With regard to the intended learning outcome on communicating in writing and orally, the

panel recommends being clearer in the requested skills with regard to English. It now says 'Communicate... in English where relevant'. The panel asks for further clarification on what is meant by 'relevant'.

The panel noticed that there is no reference to the term from the title 'agriculture' in the programme's intended learning outcomes. Also, the profile text focuses on biosystems engineering and not agriculture, which would be expected given the title of the programme. The panel recommends aligning the title and elaboration more closely.

The panel noticed that in the overview of assessments linked to the intended learning outcomes, two additional intended learning outcomes were mentioned. These relate to making a well-founded choice for a follow-up master's programme or a job in the labour market, and to developing a critical attitude. The panel finds the latter particularly relevant, leading the panel to recommend adding this to the list presented in the overall profiling document.

Regarding the master's programme, the panel notes the following. The profile of the programme is relevant, well known and the thesis tracks cover important aspects of the domain. The panel appreciates the clear elaboration of the thesis tracks in the intended learning outcomes.

Taking these considerations into account, the panel assesses that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Teaching-learning environment

Standard 2: The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

The academic year consists of six periods. Period 1,2,5 and 6 comprise seven weeks of classes, time for self-study and the exam week. In these periods students of the programmes often follow two courses worth 6 EC each. Periods 3 and 4 entail four weeks in which both the lectures and the exams take place. In these periods students usually follow one course worth 6 EC.

The curricula and teaching-learning environment of the bachelor's programme and the master's programme is discussed separately. General information is then given for the two programmes on admission criteria and staffing.

Bachelor's programme Agrotechnologie

The Dutch-language fulltime bachelors' programme has a duration of three years and comprises a total of 180 EC. The programme offers five learning lines: 1. Mathematics and Physics, 2. Life Sciences, 3. Social Sciences, 4. Engineering and Design and 5. Free Electives or a Minor. General academic skills such as academic writing and presenting are taught in a number of different courses.

The programme has a large common part, providing the students with a broad basis in mathematics and physics, life sciences, social sciences, and a number of engineering disciplines. The first two years include mostly compulsory courses. The first year includes introductory courses. The second year contains broadening and deepening courses. The third year consists of free choice and the thesis.

The main purpose of the first-year programme is to give the students a good impression of the programme's content and level of education and to provide a solid base of skills and knowledge. The main purpose of the second-year programme is to deepen students' engineering knowledge and understanding. The third year of the programme serves two purposes. The first is to broaden students' knowledge via a minor or a well-founded choice of elective courses. The programme's structure allows students to take free electives in both the first and the second semester. The second purpose is to unite and assess the knowledge and skills that students have learned in the first two years by means of the bachelor thesis.

The programme is developing a new learning line to be implemented in the programme starting September 2025. In this new learning line, all steps of the engineering cycle (Plan – Do – Check - Act – Measure - Analyse & Start again with Plan) are introduced. Currently, the programme focuses mainly on the Measure, Analyse, and Plan activities. Besides, the programme believes that increased opportunities for students to go through the entire engineering cycle and be able to learn from a practical setting, rather than purely a digital one, should increase the attractiveness of the programme. When the new learning line is introduced, several adjustments are made to the programme. Practicals are added and a new core course Introduction to Mobile Robotics is implemented. The new course will replace 6 EC from other courses. This was seen as an opportunity to critically look at the current programme and restructure it. The panel recommends further investment in, in

particular bachelor programme specific, technical teaching facilities.

The programme consists of lectures, working lectures (making assignments under the guidance of a lecturer), practica (practical assignments in a lab room) and self-study.

Master's programme Biosystems Engineering

The English-language fulltime master's programme has a duration of two years and comprises a total of 120 EC. The programme builds on the broad basis of students and goes more in depth, addressing the complexity and the challenges when technology and organic products meet. The programme has a small common part in which students further develop their skills in modelling, design, and quantitative assessment of technical innovations of biosystems. This common basis is followed by specialisation in tracks containing specific courses, and a thesis project. The seven tracks are described in standard 1.

The programme has three mandatory courses taught at the beginning of the academic year. These three courses provide a foundation in domain related knowledge and skills of analysing and designing biosystems, developing representative mathematical models, and developing innovative solutions to Biosystems Engineering problems. Afterwards, students take two courses of 6 EC related to the thesis track and the Academic Master Cluster (12 EC). The Academic Master Cluster offers students the opportunity to practise and develop their general academic skills and an interdisciplinary approach. In the first year, students also have 18 EC available for electives. The second year of the master's programme consists of the MSc thesis (36 EC) and a four month long academic internship (24 EC).

Admission requirements

Students are admissible to the bachelor's programme with a vwo diploma with the profile Nature and Technology or the profile Nature and Health (with Physics). There are opportunities for admission based on other diplomas. For example, there is the possibility for admission of students aged twenty-one or older through the so-called Colloquium Doctum.

For the master's programme Biosystems Engineering, the entry requirement is a bachelor's degree in Biosystems Engineering, or equivalent. The norm for this equivalence is a minimum of 60 EC in Engineering, including (quantitative) modelling skills, programming skills (for example MatLab, Python or R), mathematics (system theory, linear algebra, first order differential equations) and statistics ((multiple) linear regression, formulation of hypotheses, non-parametric tests, contingency and chi-squared tests). Not all topics mentioned need to be mastered at the same level; they will be weighed by the Admission Board per individual application.

Staff

The programmes present a list of around 70 lecturers teaching in one or both programmes. Lecturers come from the various chair groups, for example Agricultural Biosystems Engineering and Agro Field Technology Innovations, but also from other disciplines such as Information Technology and Microbiology. Most lecturers hold at least the University Teaching Qualification or are in the process of obtaining the qualification.

From the start until the end of the bachelor's and master's programmes, pro-active and upon request personal guidance is provided. Pro-active action is taken upon students with a delay in study progress according to a monitoring protocol developed by the programme team.

The team for the bachelor's and master's programme contains 2 study advisers. They are dedicated to guide students through their studies. For students with a functional disability, students can also appeal to the study advisor, the student deans, or psychologists.

It is clear from the student chapter and interviews that students are positive about the staff. According to the bachelor and master students, teachers are knowledgeable and have much practical experience in the field. They, as well as study advisors, are easily approachable and have close contact with students. There is a flat hierarchy. Teachers support students with learning disabilities.

Considerations

The panel has established that the contents of the two programmes enable students to achieve the intended learning outcomes. The bachelor's programme and the master's programme have clearly translated the intended learning outcomes into the educational programmes. Innovations in the field of biosystems engineering are, or will be, included in the programme. The panel notes that the curricula are sufficiently coherent, while at the same time giving students a lot of freedom in designing their individual study paths. The scope of both the bachelor's and master's programme are clearly multidisciplinary and international, matching the profiles of the programmes. In the eyes of the panel, the admission requirements adequately match the programmes.

In the eyes of the panel the didactic concept of the programmes structures the programme and supports the learning process of the students. The educational formats are adequate. The panel appreciates the choice of smaller groups in the lectures of general courses. The panel notes a particularly good atmosphere. Students and alumni indicate that they find the lecturers approachable and helpful. According to the students, there is no unreasonable hierarchy, and the teachers and staff have genuine interest in students.

The programme has a desire to start using new facilities for education, such as physical models instead of only digital computer models. The panel agrees with the need for new facilities; the activities and operations will be more applied and easier to follow. It is in line with students' desire to gain more experience with practical applications during their studies. Theory and software on using robots, for example, is part of the study programme, but its application is insufficient, according to students.

The panel observed that the programmes have a strong teaching team. The various disciplines are well represented by the input of staff from a variety of research groups, as is practical and scientific experience in the various fields of work. The panel observed that the staff is also qualified for the execution of the programme in terms of educational expertise. The panel notes that all staff members have adequate English language skills for teaching, which is partly ensured by appropriate policies on teachers' English-speaking skills. The panel appreciates the opportunity to get an appointment with an emphasis on teaching, which increases the number of lecturers with a focus on developing and delivering teaching.

To strengthen collaboration between the teachers of the different chair groups, the programme director plans to establish an annual team day. The panel finds this positive, so that cohesion, connection to each other's work and understanding of this particular discipline is strengthened. Indeed, the panel notes that master's students in particular indicate that in compulsory courses, lecturers sometimes disagree on certain topics and what they expect.

The tutoring and provision of information to students are conducive to study progress and tie in with the needs of the (international) students and students with functional disabilities.

The panel has some specific considerations regarding the bachelor's programme.

The panel appreciates the structure and coherence of the programme and its interdisciplinary, with biological, technical, economical, and societal perspectives on agriculture. This was confirmed by the students, who indicated that the order and contents of courses makes a lot of sense.

Students recognise the uniqueness of the study programme, which distinguishes itself from other technical studies because of the work with living materials, the orientation on the agricultural sector and the broad knowledge. The panel does advise the programme to look for ways to increase contact with the field and to incorporate the breadth of the field in case studies. Students indicate that used casuistic during courses does not represent the complete work field. As also indicated by the students, the small scale of the study population is helpful for good relationships between teachers and students.

The panel understands there have been and will be changes to the bachelor's programme. To gain a better understanding of how, with these changes, the intended learning outcomes are still well covered by the programme, the panel recommends making more transparent how the learning outcomes are linked to the courses. Currently, the panel lacks a clear overview.

The panel also has some specific considerations regarding the master's programme.

The panel appreciates the differentiated group of students in the programme. The programme pays sufficient attention to the different starting levels of the students. For instance, they have differences in programming knowledge at the start, which is addressed in the first courses. In the international classroom, students come into contact with different views from (international) students on agriculture. The onboarding of international students is good. Students receive sufficient support to work in groups and to take cultural differences into account.

The panel supports the programme's intention to better prepare its own bachelor students for the differences between students in the master's programme, as they are not used to this in the more homogeneous bachelor's programme. The programme could, according to the panel, even better make sure all education is relevant and open for internationals (Dutch excursions with only Dutch documents for example).

The many options in the programme are appreciated by the students. This makes it possible to choose their study plan based on their own preferences and interests, still fitting the aim of the programme.

A 12 EC course in the first year is the Academic Master's Cluster. The panel advises the programme to keep the valuable academic master cluster, but make it more useful by choosing projects appropriate to the programme.

The panel is positive about the multi-day excursion at the start of the master's programme, which gives students an idea of the working field and also aims to bond the various groups of students. The previous panel in 2018 recommended scheduling this excursion early in the programme. This is now the case; it takes place in the second week of the study year.

In summary, according to the panel, the curriculum, faculty, and facilities for all two programmes form a cohesive, inspiring learning environment. Taking these considerations into account, the panel assesses that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Student assessment

Standard 3: The programme has an adequate system of student assessment in place.

Findings

The bachelor's programme and the master's programme present an overview of the forms of assessment per course. The intended learning outcomes to be assessed are indicated for each assessment. This overview shows that frequently used assessment forms are written exams (open and/or closed questions), oral exams (individual and with two students), practical performance (individual and group), reports or other written (group) assignments and (oral) presentations.

To properly assure the quality of interim examinations and final examinations, there are institution-wide guidelines and instructions for assessment. These guidelines and instructions include the following: the method of testing whether the student has met the learning outcomes; the procedures for testing in individual teaching methods; the role of assessment strategies and assessment criteria in the examination per course; and the supervision on these aspects by the Examiners and the Examining Boards.

Wageningen University has four Examining Boards: Life Sciences, Social Sciences, Environment and Landscape, and Technology and Nutrition. Each of the Boards is responsible for the examination arrangements for one of the four groups of study programmes. Joint degrees have their own specific Examining Boards. The two programmes fall under the Examining Board Technology and Nutrition. This board consists of a chair, a secretary, a second secretary, six members employed by the University and one external member.

The Examining Board evaluates the sets of study components, approves exemptions, and determines the results of the final evaluations of the study programmes. The Examining Board is also responsible for assuring the quality of interim examinations and final evaluations. The secretary is the contact person for all Examining Boards. The Examining board periodically consults with the programme directors.

Considerations

The panel judges that the programmes have an adequate, solid assessment system and assessment procedures. The system is adequately based on the university wide policy, the panel notes. Multiple adequate assessment types are implemented in the programmes: from written exams to (individual and group) assessments. The panel believes that the variety of assessment formats allows students to develop the necessary knowledge and skills.

As mentioned in standard 1 for the bachelor's programme, it is not clear from the intended learning outcomes what the programme expects from students with regard to communication in English. This is also visible in assessment: the panel does not find it clearly substantiated why assessments should or should not be made in English, such as the thesis. The panel recommends establishing clear guidelines for this, referring to the requirements for students with regard to English communication.

According to the panel, the procedures for assessing the final product of the programmes, the thesis, are clear and the assessment itself is

sound. However, the panel notes that the feedback on assessment forms of theses is not always of the same level. In several cases, for example, the feedback is missing, is limited, or only mentions points for improvement, so that the grounds for the judgment are not in line with the outcome from the completed Rubric. This is more the case with bachelor's theses than with master's theses, where procedures are already more standardised. Such standardization and automation of the thesis evaluation process should be a best practice for the bachelor's programme to adopt. The panel observes that the programmes pay attention to the justification on the forms and recommends that the programmes continue this attention, for example in calibration sessions with each other to assess whether the justification for a judgement can also be followed by outsiders.

The panel appreciates the clarification in the role of the external assessor in the internships. The panel finds it an appropriate choice that only staff members of internship providers with a PhD (or similar professional qualification) are allowed to assess the report.

There is a focus on the use of AI in student products. Guidelines are in use, but programmes would benefit from a stronger central policy, according to the panel.

According to the panel, quality assurance of assessment is ensured by a proactive Examining Board for the programmes. The Board, focusing on a group of programmes, show a sufficient knowledge of the individual programmes and its assessment. Since the previous accreditation, the capacity of the Board is sufficiently increased, and its agency in relation to the rather autonomous Chair Groups is improved. The Examining Board has scheduled a thesis review for next April. For ensuring the quality and uniformity of assessment in general, the panel appreciates the increased use of calibration sessions in which assessors participate.

Taking these considerations into account, the panel assesses that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Achieved learning outcomes

Standard 4: The programme demonstrates that the intended learning outcomes are achieved.

Findings

Bachelor's programme Agrotechnologie

Students complete their specialisation with an individual thesis (24 EC), It assesses all nine intended learning outcomes. Students perform the following activities:

- Analyse a problem and write a project plan for the intended research.
- Organize the individual management of a research project.
- Do experimental research, literature research, data analysis, and present results.
- Gather and interpret information from different sources and use this in the research.
- Write a thesis report according to the scientific standards.
- Orally present the thesis clearly and fluently, using supportive media.

After the bachelor's programme, students have access to several master's programmes. The bachelor's programme leads directly to the master's programmes Biosystems Engineering, the master's programme Biobased Sciences and the master's programme Development and Rural Innovation. Besides the programmes to which students have direct access, there are some opportunities to move on to other master's programmes.

Master's programme Biosystems Engineering

With the master's programme thesis (36 EC), the programmes aim to assess most of the intended learning outcomes. The other learning outcomes are assessed elsewhere in compulsory courses. Working in an interdisciplinary team is for example assessed in the Research Master Cluster.

With the thesis, students show they are able to independently conduct a research project, which includes among other activities the development of a research plan, collecting data, analysing data and reporting on the research.

In Augustus 2024 the programme examined what the current jobs of graduates are. A total of 234 alumni graduated in the past six years. The largest group (32%) is working in Research and Development in a company. The group working for research and education is 18%. Wageningen University & Research caters 11% of the graduates. 16% of the graduates works as Data Analyst or Software Engineer. 13% of the graduates work as consultant or in sales. 9% became an entrepreneur. Among them are a few farmers, but this is a minority of 3%. Most found a company on an agricultural related product or service. Various types of managers add up to 8% of the graduates. This leaves 4% in the category other.

Considerations

To form an opinion about the final level of the students, the panel read recent theses of fifteen graduates per programme and viewed the assessments of these works. The selection included theses with a variety of topics and a distribution between lower and higher grades. Theses from all specialisations were considered. The panel found that all the theses attested to the bachelor's or master's level and the content matches the profiles of the programmes. The quality of the works varies, with the grade given

corresponding to the panel's assessment of quality. In general, the panel was pleased with the quality of the work and the accuracy of their assessments. Adequate research ability is evident in all theses. This finding is in line with the strong research profiling of the bachelor's programme and the master's programmes.

The speciality of this bachelor's programme is a strong focus on building engineering skills and this should be also visible, statistically, in completed theses. The panel recommends supervisors and advisors of bachelor's theses to reflect in each case whether the ambition level of the bachelor's thesis at hand matches with the intended learning outcomes of the programme i.e. providing students the possibility to demonstrate some engineering skills learned in first two years

The panel appreciates the possibility in the master's programme to choose a design project instead of a research project for the internship. This fits well with the programme's profile.

From the current survey and conversations with alumni, the panel concludes that the master's programme prepares students well for the job market and that students end up in positions that fit the intended exit profiles. The panel appreciates the strong network with alumni that the programmes have. The panel recommends that the master's programme should properly discuss professional opportunities and current student outflow with students. They indicate in the student chapter that they lack insight into opportunities, especially outside the research area.

Taking these considerations into account, the panel assesses that the bachelor's programme Agrotechnologie and the master's programme Biosystems Engineering meet this standard.

Attachment 1: assessment panel

Stanley Brul, chair, is a professor at the University of Amsterdam specializing in microbial food safety and molecular biology. He has led research projects funded by NVWA and NWA-ORC METAHEALTH. He is also an educator, program coordinator, and evaluator for academic programs, contributing to various national and international scientific committees.

Marloes van Dort is a senior education policy advisor at Erasmus University Rotterdam. She has expertise in curriculum development, assessment, and educational policy. She played a key role in implementing new study programs and quality assurance frameworks.

Wolfgang Büscher is a professor of agricultural sciences at the University of Bonn, focusing on livestock systems and precision farming. He has published widely in the field and has worked on projects improving sustainability in animal husbandry.

Timo Oksanen is a professor of Agromechatronics at the Technical University of Munich. He specializes in robotics, automation, and intelligent agricultural machinery. He has also been a visiting professor at Aalto University and conducts research on smart farming technologies.

Thomas Westerhuis is an MSc Biomolecular Sciences student at the University of Groningen. He has served as a student assessor and is trained by NVAO as a student panel member.

The panel was supported by Linda van der Grijspaarde as an independent secretay on behalf of AeQui.

All panel members have completed and signed a statement of independence and impartiality, and these have been submitted to NVAO.

Attachment 2: site visit program

Tuesday 21 January

Time	What	Who
9.00-9.30	Arrival panel	-
9.30-10.15	**Management of programmes**	- Programme Director - Dean of Education - Adjunct Programme Director - Member Daily Board Programme Committee - Chair Daily Board Programme Committee
10.15-10.30	Break	
10.30-11.15	**Students bachelor's programme Agrotechnologie (BAT)**	- Student BAT-5 (2020) - Student BAT-1 (2024) - Student BAT-1 (2024) - Student BAT-4 (2021) - Student BAT-4 (2021) - Student BAT-2 (2023) - Student BAT-4 (2021)
11.15-11.30	Break	-
11.30-12.15	**Students master's programme Biosystems Engineering (MBE) + alumni**	- Student MBE-2 (2023) - Student MBE-1 (2024) - Student MBE-2 (2023) - Student MBE-2 (2023) - Student MBE-2 (2023) - Alumna 2021, PhD WUR - Alumna 2023, Hydrosat
12.15-13.30	Lunch and deliberation	-
13.30-14.15	**Teaching staff BAT and MBE**	- Staff member - Mathematical and Statistical Methods - Biometris - Staff member - Operations Research and Logistics - Staff member - Agricultural Biosystems Engineering - Staff member Ridder - Bioinformatics - Staff member - Agricultural Biosystems Engineering - Staff member - Information Technology

Time	What	Who
14.15-14.30	Break	
14.30-15.15	**Examining Board + Study advisor(s)**	- Secretary EBTN – Quality Assurance - Secretary EBTN – student related matters - Member Examining Board - Study Advisor - Study Advisor
15.15-16.30	Deliberation	
16.30-17.00	**Preliminary feedback**	
17.00-17.45	**Development dialogue/theme session**	- Programme Director - Dean of Education - Adjunct Programme Director - Daily Board Programme Committee - Chair Daily Board Programme Committee - Mathematical and Statistical Methods - Biometris - Agricultural Biosystems Engineering - Study Advisor
17.45	Closure of the day - drinks	

The open consultation took place online prior to the visitation. One staff member signed up for this. The chair and the secretary of the panel had an online meeting to hear this staff member's input. This input was brought in during the visitation and included in the determination of findings.

Attachment 3: Recommendations from previous assessment

The programmes were last visited for accreditation in 2018. The following overview of recommendations from the previous visitation and follow-up by the programme is taken verbatim from the documentation of the programmes. The panel states that the programmes have incorporated the recommendations well. Some recommendations, although already well addressed, could be further developed. Under the various standards, the panel addresses this.

Recommendation: Work out the learning outcomes for the learning lines in the BSc to make the programme clearer for students.
New learning outcomes have been formulated covering the learning lines. However, in practice the learning outcomes remain quite abstract for most students.

Recommendation: The Wageningen brand could be used better for its international recruitment.
Since the BSc is (mainly) in Dutch, International recruitment is relevant to the MSc. Indeed, more international students are coming to Wageningen: from about 8 in 2015-2018 to about 12 2019-2023.

Recommendation: A challenge in the MSc is a proper balance between broadness and focus. We strongly advise to discuss the study programme with the study advisor.
Since the students have a lot of freedom in composing their study programme, they can focus or widen their view as they wish.

Recommendation: To overcome the supervision workload, the theses could be distributed better between different chair groups and staff members.
Thesis possibilities outside the FTE/ABE group have been recommended strongly by the study advisors. A shift is currently occurring, as can be seen in the Annual Report.

Recommendation: The low success rate of the BSc should remain a point of attention.
Covid caused a lot of study delay. However upwards of 90% of the students who continue into the second year will graduate.

Recommendation: The multi day excursion in period 1 to improve integration of new MSc students is advised to take place earlier in period 1.
The excursion has indeed been rescheduled to the second week of the study year. To achieve this, the excursion takes place inside the Netherlands (or just across the border). According to students this has the desired effect of bonding the various groups of students.

Recommendation: The level of English writing is not sufficient for all students. Therefore, it is advised to incorporate English writing skills in MSc-courses.
Unfortunately, there is no room for English writing skills in the compulsory courses of the MBE programme. However, students have the option to take a small course on academic writing as part of the

Academic Master Cluster. Additionally, we advise students to seek out the Wageningen Writing Lab to improve their academic writing skills.

Recommendation: The declining success rate requires attention.
The success rate of both the BSc and MSc have improved.

Recommendation: The plagiarism check for the thesis is not clear.
An option to perform a plagiarism check has been implemented for all BSc theses via the Brightspace page. This has also been implemented by many chair groups for the MSc thesis.

Recommendation: Unclear use of the rubrics for thesis assessment; Unclear use of weighing factors in thesis assessment form (why do they differ between chair groups?).
For the MSc thesis, the whole thesis assessment has been aligned and automated in Osiris; all chair groups use same procedures and assessment forms. However, due to the content of the thesis research (e.g. design thesis or literature study), different weighing factors can be used. For the BSc thesis, we currently collaborate with other BSc programmes to develop a standardized rubric to be used in (nearly) all programmes.

Recommendation: Examination committee lacks time to control the quality of interim examinations; The examination committee quality control cycle of 5 years is too long.
The relevant examination committee was able to hire extra staff and is now able to visit chair groups during which the quality of interim examinations is assessed.

Recommendation: Suggestion to cooperate more with Eindhoven and the other Technical Universities to provide more depth in engineering disciplines when needed.
We are glad that in the 4TU cooperation more exchange of research and staff is taking place, especially in the field of Agro-robotics.

Attachment 4: reviewed documents

- Cover letter
- Development dialogue - questions

Practical information visit
- Visit Programme BAT MBE 21-01-2025
- Map of the WU campus

General information WU and BAT/MBE:
- Governance structure and the organization of WU degree programmes
- WU Vision for Education 2017
- EER WU 2024-2025
- Assessment Policy WU 2023
- Framework for Education Wageningen University 2024-2025
- Study Advice Service level commitment 2023
- Education Monitor BAT/MBE
- Eindrapporten visitatie BAT en MBE in 2018
- BAT Student chapter SWOT 18 nov 2024
- MBE Student chapter SWOT 21 nov 2024
- Documentation AI Policy

Standard 1 Learning Outcomes:
- BAT Profile, Learning outcomes and programme structure 2024
- MBE Profile and Learning outcomes 2024
- Intended programme learning outcomes and dublin desciptors
- Skills profile BAT
- Verslag werkveldcommissie maart 2024 (in Dutch)

Standard 2 Teaching and Learning environment
- Structuur BAT (curriculum)
- Structuur MBE (curriculum)
- MBE thesistracks overview
- Overview courses and learning trajectories BAT
- Lectures BAT and MBE

Standard 3 Assessment:
- BAT assessment matrix 23-24
- MBE assessment matrix 23-24

Standard 4 Achieved Learning Outcomes:
- Alumni MBE factsheet

- MSc after BAT and previous education MBE

Course Materials

- BAT:
  - PAP10806 Perspectives on Sustainability Transitions in Agriculture
  - BCT20306 Modelling Dynamic Systems
  - FTE273006 Machine Vision
- MBE:
  - FTE33806 Biosystems Design
  - FTE31306 Greenhouse Technology
  - ORL30306 Decision Science 2

Thesis selection

- Course guide en rubric MSc thesis
- Course guide Thesis BAT
- BSc Thesis assessment form BAT
- BSc Thesis and assessment form of 15 students
- MSc Thesis and assessment form of 15 students

Exam committee

- Annual report of FBE (Facultair Beleidsoverleg Examencommissies) 20/21, 21/22 en 22/23

Programme committee

- PC annual reports and plans 20/21, 21/22, 22/23 en 23/24