

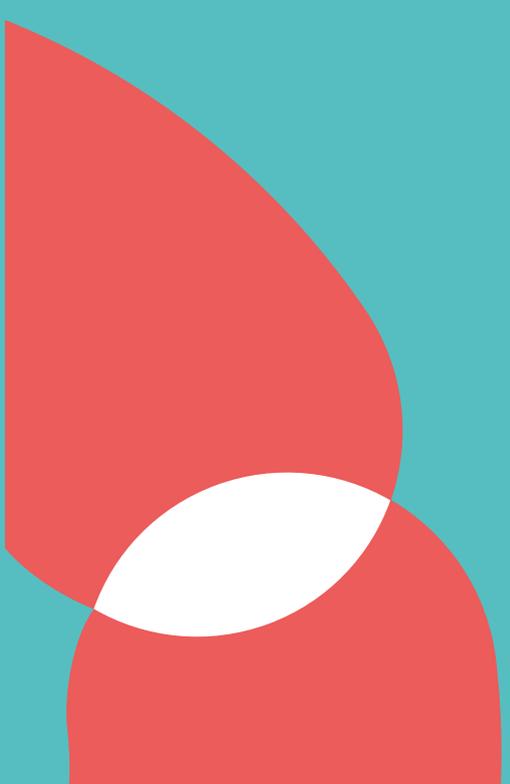


NVAO • THE NETHERLANDS

INITIAL ACCREDITATION

WO-MASTER CROP BIOTECHNOLOGY AND
ENGINEERING (JOINT PROGRAMME)
MAASTRICHT UNIVERSITY
RADBOD UNIVERSITY NIJMEGEN

ADVISORY REPORT
15 MAY 2025



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1 Peer Review

The Accreditation Organisation of the Netherlands and Flanders (NVAO) assesses the quality of a new programme through a peer review process. This initial accreditation is mandatory for an institution that seeks to award a recognised degree upon the successful completion of a study programme.

The procedure for accrediting new programmes differs somewhat from that for existing programmes that have already been accredited. Initial accreditation serves as an *ex ante* assessment of a programme's quality. Once accredited, the new programme becomes subject to the standard review process for existing programmes.

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 advisory report. The focus is on the curriculum, the teaching and learning environment, and student assessment. The agenda for the panel visit and the documents reviewed are available from the NVAO office upon request.

The peer review outcome is guided by the standards outlined and published in the NVAO Assessment framework for the higher education accreditation system of the Netherlands (Staatscourant 2024, nr. 6405). Each standard is evaluated on a three-point scale: meets, partially meets, or does not meet the standard. Based on this evaluation, the panel will rate the programme's overall quality as positive, conditionally positive, or negative.

NVAO makes the decision on the programme's quality based on this advisory report. This accreditation decision can be positive, conditionally positive or negative. If the decision is positive, with or without conditions, the institution may proceed to offer the new programme. Graduates of the programme will then be entitled to receive a legally accredited degree.

This report presents the panel's findings, analysis and judgements resulting from the peer review. It also details the commendations and recommendations for follow-up actions. A summary report highlighting 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 about NVAO and peer reviews of new programmes.

2 New Programme

2.1 General data

| | |
|---------------------|--|
| Institutions | Maastricht University Radboud University Nijmegen |
| Programme | Master Crop Biotechnology and Engineering |
| Variants | Fulltime: Yes. Parttime: No. Dual: No. |
| Degree | Master of Science (joint degree) |
| Location | Venlo |
| Study load | 120 EC ¹ |

2.2 Profile

The master's programme in Crop Biotechnology and Engineering is a joint programme between Maastricht University (UM) and Radboud University Nijmegen (RU). The master educates students on the cutting edge of agricultural practices and educates skills in biology, technology and engineering. The programme prepares students to work across the entire innovation chain leading to robust crop plants and high-tech horticulture. The location of the programme is on the Brightlands campus in Venlo, in close proximity to industry partners. The programme uses a unique mix of educational approaches, which are problem-based learning (PBL), team-based learning (TBL) and research-based learning (RBL). Students develop fundamental and applied expertise in crop traits and breeding, production conditions and technology. Students contribute to contemporary themes in sustainability such as healthy nutrition for a growing global population, the biobased economy, and innovations in the agricultural and horticultural sectors, including optimal climate systems, autonomous cultivation, and personalized crop production.

2.3 Panel

Peer experts

Prof. dr. Vera van Noort (chair), Professor of Computational System Biology – Faculty of Bioscience Engineering- KU Leuven and Professor of Computational Biology– Institute of Biology Leiden (IBL) – Leiden University;
Dr. Marcel Proveniers (member), Assistant Professor (UD)/Translational Plant Biology Utrecht University;
Dr. Gert-Jan de Boer (member), Manager Research & Applications Molecular Biology Application, ENZA Zaden R&D B.V.;
Vincent van der Wolf BSc (student-member), Master Population Health Management Leiden University (following);

Assisting staff

1. Eva de Haan MSc MEd, secretary
2. Anne Klaas Schilder MA, NVAO policy advisor and process coordinator

Site visit

Venlo, 4 April 2025

¹ European Credits

3 Outcome

The NVAO approved panel reached a positive conclusion regarding the quality of the Master Crop Biotechnology and Engineering (CBE) offered by Maastricht University and Radboud University Nijmegen. The joint programme meets all standards of the NVAO framework.

The master CBE is a master programme focused on both biology and engineering aspects of crop technology. Students will become well-rounded professionals with advanced knowledge of the state of the art in high-tech horticulture. The programme offers an interdisciplinary approach primarily focused on biology and cultivation technology. The master is a joint programme between two universities which have signed a cooperation agreement. The intention of the partners is to distribute efforts equally between them. To implement this in practice, the programme director and vice-director will alternate between the partners.

The proposed curriculum for the CBE master is extensive and complete and covers the intended learning outcomes. The panel finds that the intended learning outcomes are well described and meet the national and international standards for a master programme on the intersection of science and engineering. The CBE programme integrates the educational concepts from both universities very well. This leads to small-scale team-based education with a strong focus on real-life problems. This enables students to be self-directed in their learning and develop strong research skills within a structured educational environment.

During the development of the programme there has been a strong connection with industry. This is furthered by the facilities and location of the Brightlands campus in Venlo where education, research and industry are co-located. The graduation project with a load of 47 EC will enable students to have an in-depth research experience during their studies. This further solidifies the strong academic profile of the CBE master.

The research environment and the industry on the topic of crop biotechnology and engineering are highly international. The location of the campus near German and Belgian borders further strengthens the international orientation of the programme. The panel agrees that the English language as the language of instruction is the logical choice for the programme. The proposed duration for the CBE master is two years (120 EC). The panel agrees with the applicants that the extent and complexity of the learning outcomes of the master programme cannot be achieved in one year. Students come into the programme from different backgrounds and need time to get acquainted with the other disciplines within the programme. After this, students need to specialize and get sufficient experience to reach the master level. The panel therefore recommends granting the applicants the right to offer the CBE master as a two-year master programme.

Through the information in the information file and the extensive discussions during the site visit, the panel concludes that the CBE master meets the quality level required by NVAO. The panel is convinced of the quality of the proposed programme and assesses it 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. Unique mix of biology, technology and engineering – The master programme uniquely combines the field of biology with technology and engineering.
2. High-tech facilities on campus – The Venlo campus has modern education and research facilities, enabling state-of-the art research and good facilities for education. The planned expansion of lab facilities and student housing on campus will make for an attractive campus.
3. Educational concepts – The educational philosophy of problem-based learning is mixed with the concept of team-based learning and research-based learning. This unique combination ensures small-scale education tailored to the learning needs of the student.
4. Close collaboration with industry - Industry partners have been asked for feedback on the curriculum and regular contacts and advice will be established through the industry advisory board. Industry partners will also supervise internship and thesis projects.
5. Academic advising – The system of appointing an academic advisor for each student, who can help with study and career choices, is applauded by the panel.

5 Recommendations

The panel recommends several follow-up actions to improve the programme further. These recommendations do not detract from the positive assessment of the programme's quality.

1. Align staff from both universities – As both universities are used to their own unique educational concepts and best practices, it is vital to inform each other of these through regularly scheduled information meetings and documentation. For future alignment it is important that staff have sufficient time to be present at campus Venlo.
2. Systematically adopt student feedback – Current students from both universities have good advice on which best practices to adopt for this new programme. Actively consult their advice while preparing and further developing the programme.
3. Actively recruit students from both biology and engineering – The programme fosters an interdisciplinary environment where students from different backgrounds learn from each other. This cooperative learning will be optimal if there are sufficient students from each background discipline.
4. Continue to consult industry for real-world input – Students work on real-world problems and projects within their courses. The industry experience with novel issues in the sector can help formulate problems and projects that reflect the state of the art.
5. Align software, programming language and other tools within the programme – Lecturers come from different backgrounds and are used to working with different tools. In order for the students to have a smooth experience in the programme, it is recommended to make deliberate choices about which tools to use.

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

Intended learning outcomes

The intended learning outcomes (ILOs) are clear and well-defined. The panel praises the unique combination of plant biology and engineering and recognizes both fields in the ILOs. The ILOs are clearly based on the Dublin descriptors, finetuned to the topics of crop biotechnology and engineering. The programme is designed to educate and deliver graduates who specialise in the development of local, healthy, and environmentally friendly food and biomass. The aim of the programme is to train students to become interdisciplinary problem solvers who can integrate knowledge, skills and attitudes from the life sciences and engineering disciplines. Graduates of the programme can look across existing boundaries and can connect to different disciplines and stakeholders. They will contribute to climate-proof crop plants and sustainable food production and ultimately enhance the horticultural industry. They will have a solid background in plant physiology and genetics, quantitative biology as well as greenhouse and cultivation technology, enabling them to develop and optimise sustainable plant-based production. In addition to developing and applying fundamental knowledge, the programme focuses on transferable skills and attitude development.

According to the information file, the intended learning outcomes have been formulated by a development team. The development team consists of academic staff members, educational and assessment experts, policy advisors, and quality assurance staff of both UM and RU. The academic staff members represent extensive research and teaching experience in the field of either plant biology, genetics and bioinformatics or greenhouse, sensor and sustainable engineering as well as an ability to integrate disciplines and research domains. The panel has met the development team and was impressed by their expertise and educational experience. The development team consists largely of lecturers that will actively teach in the programme and continue the development after the programme has started. The various staff members from UM and RU each bring their own unique research expertise. Some UM lecturers are more geared towards the engineering or (bio)informatics aspects, and some RU lecturers more on the bioscience and plant ecology aspects of the field. Their complementary expertise is necessary for the interdisciplinary nature of the programme.

The panel spoke to students who are enrolled in related programmes and have similar profiles as students who would follow this programme in the future. The students clearly appreciate the interdisciplinary focus of the programme, from engineering to consumerism and sustainable farm practices. This highlights that the combination of expertise from UM and RU is necessary for the programme. The broad focus and integration of disciplines within crop biotechnology and engineering is unique to the CBE master. The panel agrees that the expertise from both UM and RU is needed in order to educate graduates towards the formulated ILOs. The panel is confident that the presented curriculum will cover the ILOs and will achieve the goal of bringing the students to the required master level in accordance with the Dublin descriptors.

Professional field

The professional field was consulted by the development team in the construction of the programme. The sector association Plantum was consulted, which represent 300 companies in the agricultural, vegetable, fruit and floriculture sectors. The programme will establish an industry advisory board with a broad range of industry partners. Individual companies in the sectors of breeding, growing, processing, food production, and logistics were consulted during the formulation of the ILOs. The continued collaboration with companies will aid the programme in the continued development of the courses. The panel recognizes that this is especially important for a programme in an emerging field which combines two disciplines that do not automatically have a common language. Industry representatives indicate that the work in the greenhouse sector is becoming increasingly high-

tech, with more focus on automation of processes. This enforces the need for experts who are well-versed in both biology and technology aspects. The panel agrees with the professional field that the presence of a high-tech greenhouse on campus for educational purposes is of great added value for the CBE master. The industry partners will be involved in the internships within the programme, which will help tailor expectations for both students and industry. The panel recommends to make use of the close industry partnerships to develop the project education within the programme. Industry partners can provide the most recent state of the art innovation, which will benefit the quality and relevance of the projects for students.

International requirements

The panel finds that the ILOs are in line with national and international scientific and professional standards. This includes the ABET² standards for Engineering programmes, the CDIO standards³, and the Dutch criteria for academic bachelor's and master's curricula of the 4TU Federation. The panel finds that the learning outcomes correspond to level 7 of the NLFQ (Dutch National Qualification Framework). It is clear that the programme management and lecturers from both UM and RU have a good connection with industry and used industry feedback on the intended learning outcomes.

In summary, the intended learning outcomes reflect the mission of the programme to educate crop biotechnology and engineering professionals. According to the panel, the ILOs are well-defined and appropriate for the master level and content of the programme. Graduates will be capable of acquiring and applying fundamental disciplinary and interdisciplinary knowledge and expertise. There is also sufficient attention for the development of the right attitude, contextual awareness and (inter)personal skills. From the information file, it is clear to the panel that the development team formulated the ILOs in accordance with all relevant national and international standards. The panel is confident that based on the ILOs, graduates will be well-equipped to develop solutions that contribute to research programmes and innovation processes that meet specific needs in academia and industry.

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 CBE master is an interdisciplinary master programme focused on the chain from crop biotechnology to the engineering of growth environments. The programme will educate students to become scientists with their own profile within the field of crop biotechnology and engineering. The programme is located on the Brightlands campus in Venlo, which features a high-tech greenhouse and lab facilities next to regular educational spaces like a lecture hall, research labs and classrooms. The programme is directly connected to developments across the Brightlands campuses and to relevant stakeholders in the region and beyond.

Joint programme

The CBE master is a joint programme between UM and RU. The necessary expertise on both fundamental (bio)science and on engineering can only be ensured by this cooperation. Both the universities of UM and RU have signed a cooperation agreement. For the CBE master, UM will act as coordinator and their rules and regulations will be followed by default. The panel agrees that for a joint programme the best approach is to choose one coordinating university and train all staff in the rules and regulations of the coordinator. The CBE programme intends to do this through calibration sessions before the start of the programme. The standard for the programme can be communicated here, as well as best practices from both partners. The panel recommends that students from both universities are consulted for these best practices.

² <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2025-2026/>

³ <https://www.cdio.org/implementing-cdio-your-institution/standards>

Both universities will alternate between appointing the programme director and the vice-director of the programme. This ensures commitment from both parties and leads to equal partnership in management. The panel spoke with motivated staff from both universities, who will equally contribute to the programme. Courses are newly designed by staff from both UM and RU, who work together in teams to develop and teach these courses. They each bring unique expertise to the programme, where UM has more focus on technology and engineering and RU on (fundamental) science and biology. The benefits and requirements of organizing this as a joint programme have been justified and recognized by all stakeholders.

Curriculum

The curriculum is clear and balanced and is comprised of mandatory courses, elective courses, projects, a portfolio and the master thesis. Students start with a mandatory course in farming systems. Next to this course students with an engineering background follow a plant biology course and students with a biology background follow an engineering course. The curriculum ensures that students have sufficient general knowledge while also having the option to specialize through elective courses. The ILOs of the programme were translated using the principle of constructive alignment to the level of the individual modules. The panel suggests including sufficient attention to the topic of phytopathology, as this is one of industry's biggest challenges. This is mentioned as part of the *Envirogenetics* course but could be repeated within the curriculum.

The mandatory courses provide a solid foundation in the crop biotechnology field. The elective courses and projects offer students the opportunity to tailor their curriculum to their own interests and professional ambitions. Within the mandatory courses there are two projects, which focus on entrepreneurship and consumer traits. The panel recognizes the importance of these projects for the programme, as they will enable students to work on real-life industry problems in depth. For the industry it is important that students learn how to bring research to the market. Surrounding topics like intellectual property and entrepreneurship are covered in the projects.

Throughout the programme a 1 EC portfolio is part of the curriculum, where there is focus on personal development and life-long learning. The portfolio helps with the academic advising of students, and helps students reflect on the choices they make within and beyond the programme. The electives in year one are deepening electives with courses in bioinformatics, circular engineering, metabolomic engineering and biosensor technology. The elective courses in the second year can be taken from the portfolio of existing courses at UM or RU (or another educational institution). These can be used to further look across disciplinary boundaries or to deepen knowledge within one (sub-)discipline within crop biotechnology and engineering. The panel agrees that the programme is sufficiently general with the option to specialize in the expertise that best suits the student.

Educational concepts

For the CBE programme, the development team uses a mix of educational concepts that are common within UM and RU. The concept of problem-based learning (PBL) and Research-based Learning (RBL) are common in UM and will be used for the classroom sessions in the CBE programme. The concept of Team-based Learning (TBL) is common in RU and will be used for the projects. All teaching staff of the CBE master will be made familiar with all three concepts during calibration sessions.

PBL is a constructive, collaborative, contextual and self-directed learning approach to enhance deep learning, motivation for learning, and skills for life-long development. Characteristic of this approach is that learning is the result of the investigation of a so-called 'problem', solved in a small group of maximum 15 students. The problem-based approach addresses complex problems and practice systematic thinking in a classroom setting. RBL focuses on academic problems and starts with small research problems in the tutorial groups and research-based skills training sessions. Within the skills training sessions students acquire practical knowledge and skills. These activities consist of laboratory, field or computer training with the emphasis on a particular topic in biotechnology or engineering. Within TBL students work together in teams of 5-7 students on projects. Central to TBL is the idea that active learning leads to deeper learning than passive learning. Therefore, students practise the use of concepts and skills to solve problems. The class time focuses on team application assignments. Throughout the programme, research challenges with an increasing complexity become part of the curriculum.

There is also sufficient attention for academic skills and for more practical skills like programming and writing. Throughout the programme academic skills are trained in the small-scale setting that the CBE master features. In the PBL groups students read and present recent academic research. In the projects, their academic skills on reading, writing, presenting and collaborating are trained. The panel supports the programme management in their decisions around the educational concepts within the CBE master. The panel recognises that all involved staff members should become proficient in the educational concepts through mandatory training. The programme management indicated that they are planning such sessions.

Combination of biology and engineering

Students with a background in biology, biotechnology or engineering are welcome to the programme. In case there is not a direct match in background or in case students come from a closely related discipline at a Dutch university of applied sciences, a tailored pre-master of one semester is available. The panel asked the management panel, lecturers and industry representatives whether it is possible to bring students up to speed in the discipline they are not familiar with using one course of 6 EC. Both the management panel and lecturers responded that one course is sufficient for a basic level, which helps to understand the language of the other discipline. The small-scale educational concept will help form small groups of about 12 students who can help each other during the programme. In these groups, there need to be sufficient students from different backgrounds in order for this effect to take place. The panel advises to have a strong recruitment strategy for both biology and engineering backgrounds, in order to have sufficient students from each background discipline. Lecturers are committed to make extra material available if students lack background knowledge. The industry representatives further solidified the panel's confidence in that the industry does not expect graduates to be immediate specialists in either biology or engineering. Once graduated, students will be able to specialize further on-the-job, and the CBE master gives sufficient tools for life-long learning.

Multidisciplinary teaching

The UM has experience with several multidisciplinary master degrees where engineering is combined with a non-engineering discipline. The staff is aware of and involved in these programmes and plans to use their best practices. RU and UM staff will have calibration sessions to ensure that the existing knowledge on multidisciplinary teaching is shared among all staff of the CBE master. An example of this is offering (pre-recorded) videos or other resources from pre-existing courses of commonly lacking pre-requisite knowledge. The panel met competent and enthusiastic staff members with diverse backgrounds in biology, biotechnology and engineering. The course material shows the multidisciplinary approach in teaching and examination. The panel agrees with industry experts that more in-depth specialisation is usually done after completion of a master programme. The panel is confident that graduates from the CBE master have the right knowledge and skills to become industry specialists.

Campus Venlo

The panel has seen a modern high-tech campus environment with good facilities for education and research. The location of the campus is in between the campuses of UM and RU and will cater to a specific group of students. The education and research facilities are already in place and are being developed further in the future. For example, more lab space will become available in the future, and there will be student housing and campus facilities like a supermarket and a bar. The homebase locations of both involved universities lie elsewhere, in Nijmegen and Maastricht. Within Venlo there is already active student life from students of the applied universities and the University College Venlo, which will help integrate students of the master CBE in a student-friendly environment. The campus development staff who is associated with the programme is in close contact with the municipality and the province. This will help the further development of the campus and the accessibility of the campus by public transport. The panel has confidence that this will lead to a vibrant student environment for the future students of this programme.

Staff

The panel met a very enthusiastic team of staff members who were able to explain the necessity for the CBE master. The lecturers of the programme are from diverse backgrounds, and work in teams to develop the courses. The joint character of the programme promotes interdisciplinary collaboration between staff from both universities. This interdisciplinary approach helps formulate interesting and diverse problems for the PBL education. The programme has specifically hired extra staff to work for the CBE master programme. Some staff

members will divide their time between either UM or RU and the Venlo location. The panel spoke to these staff members, and they are dedicated to spend the entire day in Venlo on the days they have educational duties there. This means that they will be available for students at the Venlo campus 2 to 3 days a week. There will also be people relocated to the Venlo campus entirely, so that there are active research groups on the Venlo campus. The panel suggests keeping regular meetings on the Venlo campus with all involved teaching staff, to promote the inclusion of all staff in the daily operations of the programme.

Student support

The panel spoke to current biology and engineering bachelor and master students who were enthusiastic about the prospect of the CBE master. The students specifically praised the academic advising system which is standard at UM and will also be implemented in the programme. The panel recommends ensuring that all lecturers for the CBE master know about what academic advising is and why it is successful, so that all involved staff can implement this practice. This can be done during the planned calibration sessions before the start of the master. Students report that they feel seen and supported by their academic advisor and feel like they are welcome to talk to them. It helps students to make choices within the programme and towards career development, with at least two compulsory meetings during each academic year. The small-scale environment of PBL education seems to be helpful for students with special needs. The panel spoke with several students who indicated that they had special needs and felt supported by the well-structured and small group environment that PBL programmes offer. The students praised the openness of staff, and their willingness to accommodate and support them in their academic life. The panel advises the programme to listen to the students' experiences of best practices from both universities so that they can be implemented in the CBE master, for example through student panels. Additional to the academic advisor, a study advisor is available throughout the academic year to provide advice on all matters pertaining to the study plan, study changes, academic growth and non-study related issues of students. Additional guidance and/or support are available from the UM Student Service Centre and the RU Faculty of Science study-advice team, Student Information Point Science and career service. The panel sees a well-supported educational environment for students of the CBE master.

English language

The academic community around the CBE programme is interdisciplinary and internationally oriented, and the staff is international. The crop biotechnology industry is inherently internationally connected and English is used as the standard language within most companies in the field. The programme is both characterised by crossing the boundaries of traditional disciplines and strengthening the links between these disciplines. The programme delivers graduates who will provide substantial and potentially leading contributions in multidisciplinary teams with people from different backgrounds. To prepare students for working in these interdisciplinary and international teams, the programme is offered in an international classroom setting and English is the common language. As the location of the campus is in Venlo, the borders to Germany and Belgium are close. This means that the student-recruitment area of UM and RU for this programme is by definition international. The labour market demand is internationally oriented. The programme is characterised by working together across and strengthening the links between disciplines. The programme is also characterised by a strong connection to stakeholders in industry and society. Offering the programme in English allows students to develop the ability to cooperate and communicate in the required international context.

Extended study duration

The information file provided a comparison to other national and international master programmes in the field of biology and engineering. Both nationally and internationally, comparable master's programmes are two-year programmes. This international comparison shows that within the field it is agreed that a two-year master is necessary for both biology and engineering programmes. The panel agrees that the extended duration is in line with the duration of (inter)national master's programmes in the field of science and engineering. In order to get students from the start level to the required master level, a two-year master programme is necessary. A large part of the second year is devoted to the master thesis, which allows students to employ the competencies acquired in an integrated research or research-based engineering project. This duration allows students to conduct a full-scale integrated research or research-based engineering project on a topic that fits their academic profile and professional ambitions. Based on these arguments, in combination with the international comparison, the need for a two-year programme is clear and supported by the panel.

In conclusion, the panel has seen an educational environment of high quality. The panel met with passionate and skilled staff of the programme and was impressed by their commitment to the programme. The Brightlands campus is well equipped for the education of the CBE master, both in regular educational spaces as in lab and high-tech greenhouse facilities. The industry partners are clear about the need for graduates from this programme and can contribute to the project education within the programme. The panel recommends to systematically adopt student feedback from both involved universities in the further preparation of the programme and during the programme. This will ensure the adoption of existing best practices from both universities, for example with respect to the academic advising and the solutions for students with special needs. In order for the online study environment to be aligned, the panel further recommends aligning tools and software between the courses. The panel is confident that the programme management and development team will follow up on these recommendations with the final preparations for the programme.

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

Quality Assurance

The information file provided a clear overview of the quality assurance that is in place for the CBE master. As UM is the coordinator of the programme, it is standard that the UM procedures are followed. The panel agrees with the choice to follow the standard procedures of the coordinating university and is confident that the calibration sessions will ensure all staff is aware of these procedures. There is a Board of Examiners in place, as well as an Educational Programme Committee. Both consist of staff from UM and RU, which further emphasizes the joint character of the programme. The Board of Examiners is responsible for quality of assessment, appoints examiners and monitors and handles complaints. All examiners in the CBE programme have a UTQ certificate next to a PhD degree or should be in the process of obtaining one within 2 years. The Board of Examiners provide input on relevant documents and procedures around the quality of assessment. The Board of Examiners informed the panel that they will organize a four-day training on calibration on PBL education and assessment for all involved staff. Additionally, there will be specific calibration sessions for new thesis graders to ensure consistency regarding quality requirements for achieving a particular grade. These sessions will bring together junior and more senior examiners and encourage them to assess an anonymised sample thesis and discuss the grading criteria and outcome. For each thesis project, there is a thesis coordinator from either UM or RU. This is an academic staff member who plays a crucial role in grading the thesis and informing the external supervisor on their role. The external (company) supervisor is not a formal part of the assessment committee. In this way the four-eye principle is always guaranteed and is guaranteed to be carried out by academic staff from UM or RU.

Forms of assessment

A variety of formative and summative assessment methods are used within the programme. This is in line with the interdisciplinary nature of the programme and the emphasis the intended learning outcomes place on the development of research, engineering and (inter)personal skills. The assessment is based on the principles of constructive alignment and is developed in line with the UM vision on assessment, as they are the coordinating university. All teaching staff of the CBE master is made aware of this vision and can consult educational advisors connected to the programme. Students are informed about the content, timing, and evaluation of the assessment in a module in the syllabus that is available upon the start of a module. Throughout their studies, students are trained in and prepared for different forms of assessment. Given the range of topics taught in the programme, different assessment methods are necessary. Examples of assessment methods are written exams with open questions, (lab) reports, presentations and papers. The project process and their deliverables are assessed on both the individual and the team level. The projects are assessed through content-related assessment forms such as written reports, lab journals or posters. Both self- and peer-evaluation are integral parts of the project assessment.

The master thesis assessment is divided in five consecutive stages and makes use of at least two qualified staff members at each assessment. The panel noticed that the rubric for the thesis has only three defined levels per

criterion. The prospective members of the Board of Examiners explained why the programme chose this approach and showed a good understanding of the benefits and drawbacks of different types of rubrics. The panel agrees that their approach is sensible and can be helpful for the discussion among supervisors. The panel is confident that the thesis procedure and rubric is robust and of high quality.

Use of generative AI

The impact of generative AI was discussed by the panel with all stakeholders. At university and programme level, discussions relating to the impact of the continuous development of generative AI are ongoing. Currently, UM-wide policy on generative AI has been made and is currently being translated at faculty level to be used in the programme. For now, the policy states that the use of generative AI is prohibited unless stated otherwise in the syllabus. Those examiners who want to, can use generative AI in their teaching and receive sufficient room to innovate. They have the possibility to follow trainings and workshops on generative AI in education and assessment. The management and lecturers are aware that generative AI is here to stay and that education and assessment are impacted. The mix of formative and summative assessments, and the small-scale set-up of the PBL learning environment helps in determining whether students are able to reach the required knowledge and skills independently. The panel has confidence that the involved lecturers are sufficiently aware of current developments in the field of generative and AI and will be trained to deal with this within the education and assessment of the CBE programme.

The panel is convinced of the quality of assessment within the CBE master. The principle of constructive alignment is known and used by staff members from both universities. Each module will have two staff members from (mostly) different backgrounds, which the panel expects to contribute to high-quality assessment. The information file provided a clear set of exam regulations for the programme. Because the UM exam regulations are primarily in use, it is important to ensure that all lecturers are familiar with the rules and regulations concerning education and assessment for the CBE master. The panel is confident that the programme will ensure this through (ongoing) calibration sessions.

6.4 Degree

The panel advises awarding the following degree to the new joint programme: Master of Science.

Abbreviations

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| 4TU | Alliance of the four universities of technology in the Netherlands |
| CBE | Crop Biotechnology and Engineering |
| ILO | Intended learning outcome |
| NLFQ | Dutch National Qualification Framework |
| NVAO | Accreditation Organisation of the Netherlands and Flanders |
| PBL | Problem-based learning |
| RBL | Research-based learning |
| RU | Radboud University Nijmegen |
| TBL | Team-based learning |
| UM | Maastricht University |
| UTQ | University Teaching Qualification |

This advisory report was written at the request of NVAO and is the outcome of the peer review of the new programme
Wo-master Crop Biotechnology and Engineering Maastricht University and Radboud University Nijmegen

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