



**B Circular Engineering
Maastricht University**

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Project code P2504

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Summary

Standard 1. Intended learning outcomes

The panel concludes that the profile of the programme is clearly articulated, relevant and timely. The programme's circular engineering approach combined with Maastricht University's problem-based learning (PBL) approach, attracts a unique student population with a strong ambition to contribute to current sustainability challenges and connect theory and practice. Another defining feature of the bachelor's programme Circular Engineering (BSc CE) is the flexibility it offers students in discovering their own interests and designing their own learning path, which is well suited to an undergraduate programme.

The panel is positive about the level and content of the ILOs. They generally align with what is expected in an academic bachelor's programme in this field and have been developed in line with regional, national and international scientific and professional engineering standards. The panel appreciates that the ILOs focus not only on technical, but also on the professional skills needed to achieve circular transitions. To further improve the ILOs, the panel recommends emphasising the programme's circular identity in at least one of them.

Standard 2. Teaching-learning environment

The PBL/CCCS educational approach of Maastricht University is appreciated by students and staff. It has been carefully translated into the BSc CE, recognizing that approaches must always be suitable for course ILOs and that multiple formats can enact the spirit of PBL/CCCS meaningfully. The BSc CE curriculum demonstrates a high level of relevance and is well structured, with a clear link between courses and programme ILOs. It features a solid core curriculum in the first year, as well as a wide and interesting selection of electives and concentrations. The extensive freedom of choice in the second year is accompanied by a good support structure for making choices leading up to the concentration packages in the third year. The thesis phase is well designed and communicated clearly to students.

The programme's admission requirements are appropriate. Students are satisfied with the support structures in place, including those for students with disabilities, and feel that their concerns are being addressed. They appreciate the short communication lines with lecturers and the programme director's open-door policy. The staff are well-qualified in terms of both content expertise and didactics. The facilities are excellent and well-tailored to the programme's needs.

Standard 3. Student assessment

Assessment in the programme is generally well-designed, with sufficient attention paid to measuring individual progress and the risks involved in assessing group work. Assessment methods align with the UM vision on assessment and are sufficiently varied. The panel and staff discussed that grades are high in one course and the panel also noted this for BTR projects. Therefore, the panel recommends that the programme continues to monitor this, to render the BTR marking rubric a bit more specific and to calibrate the markers on a regular basis to ensure common understanding and interpretation. The panel concludes that responsibilities for ensuring assessment quality are clearly assigned, and that the relevant regulations are suitable and transparent. While the BoE is performing its tasks adequately, the process and outcomes of activities in the areas of course grade analysis and screenings of course assessments and theses should be reported more explicitly. Therefore, the panel recommends that the findings and recommended follow-up actions of these activities be made more visible in the annual BoE reports.

Standard 4. Achieved learning outcomes

The panel concludes that students achieve the intended learning outcomes of the programme. Until now, graduates have been well placed to enter relevant master's programmes.

Score table

The panel assesses the programme as follows:

Bachelor's programme Circular Engineering	
Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	
positive	

The assessment panel has reviewed the report and agrees with its contents. On behalf of the panel,

Prof. dr. Francesco Picchioni

Adrienne Wieldraaijer-Huijzer MA

Date: 9 March 2026

Introduction

Procedure

Assessment

On 12 and 13 January 2026 the bachelor's programme Circular Engineering of Maastricht University was assessed by an independent peer review panel. The assessment followed the procedure and standards of the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands (April 2024).

Quality assurance agency Academion coordinated the assessment upon request of Maastricht University. Adrienne Wieldraaijer acted as coordinator and secretary. She has been certified and registered by the NVAO.

Panel composition

Academion composed the peer review panel in cooperation with the institutions and taking into account the expertise and independence of the members. On 29 September 2025, the NVAO approved the composition of the panel. Academion instructed the panel chair on his role in the site visit according to the Panel chair profile (NVAO 2016) on 2 September 2026.

Preparation

The programme composed a site visit schedule in consultation with the coordinator (see appendix 3). The programme selected representative participants for the various interviews. It also determined that the development dialogue would be made part of the site visit. A separate development report was made based on this dialogue.

The programme provided the coordinator with a list of graduates in the academic years 2023-2024 and 2024-2025. In consultation with the coordinator, the panel chair selected 15 graduates. They took the diversity of final grades and examiners into account. The panel selected graduation files of five graduates with a concentration in Circular Chemical Engineering, four graduates with a concentration in Engineering Physics for Sustainable Manufacturing and six graduates with a concentration in Sustainable Biotechnology. This selection reflected the number of graduates in each particular concentration proportionally. The panel also took into account that final projects can be completed with internal university partners as well as external organizations. The panel selected nine projects at internal university partners and six projects at external organizations, and ensured a balanced distribution across different organizations. The graduation files of the programme (Bachelor Thesis Research, BTR) consist of several products: a research proposal, a midterm assessment of practical work, a final assessment of practical work, a thesis and a final presentation. The thesis and final presentation contribute most significantly to the student's final grade. The quality of practical work is harder for panel members to assess, as they did not witness the practical work being performed. In consultation with the coordinator and chair, each expert panel member received two BTR-files with all products and three BTR-files with only the thesis and the final presentation. Thus, in total, the panel reviewed six complete BTR files (including assessment of practical work) and nine BTR files without the practical work assessment. The panel also received the corresponding completed assessment rubrics.

Prior to the site visit, the programme provided the self-evaluation report and additional materials (see appendix 4). The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation report, additional materials and the theses, as well as the division of tasks during the site visit. The panel was also

informed on the assessment framework, the working method and the planning of the site visit and report, and offered students and staff members an opportunity for confidential discussion during an online consultation hour. No consultation was requested.

Site visit

During the site visit, the panel interviewed various programme representatives (see appendix 3). The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented general observations of the panel, findings, conclusions, and recommendations for further improvement.

Report

The secretary wrote a draft report based on the panel's findings and submitted it to an Academion colleague for peer assessment. Subsequently, the secretary sent the report to the panel for feedback. After processing this feedback, the secretary sent the draft report to the programme in order to have it checked for factual irregularities. The secretary discussed the ensuing comments with the panel chair and changes were implemented accordingly. The panel then finalized the report, and the coordinator sent it to the Faculty of Science and Engineering of Maastricht University.

Panel

The panel assessing the bachelor's programme Circular Engineering at Maastricht University consisted of the following members:

- Prof dr. Francesco Picchioni is professor in Product Technology at the Chemical Engineering Department (Chemical Product Technology) of the University of Groningen;
- Prof. dr. Ernest Meštrović is professor in General and inorganic chemistry at the Faculty of Chemical Engineering and Technology of the University of Zagreb (Croatia);
- Prof. dr. Jarka Glassey is emeritus professor of Chemical Engineering Education at the School of Engineering of Newcastle University (United Kingdom, 2015-2025);
- Deena Elhassan is a third-year bachelor's student in Chemical Science and Engineering at the University of Twente.

Each panel member, the panel secretary and the programme have filled out the Statement of Impartiality and non-disclosure agreement, as required by the NVAO. They can confirm that the assessment was carried out in complete independence. Due to circumstances beyond his control, Prof. Ernest Meštrović participated in the site visit online. All other panel members were present on site.

Information on the programme

Name of the institution:	Maastricht University
Address:	Paul-Henri Spaaklaan 1, 6229 EN Maastricht
Website:	https://www.maastrichtuniversity.nl/
BRIN-number:	21PJ
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Circular Engineering
ISAT number:	59341
Orientation of the programme:	Academic
Level of the programme:	Bachelor (NLQF 6)
Number of credits:	180 ECTS
Language of instruction:	English
Professional requirements:	None
Location:	Maastricht, Sittard-Geleen (lab location)
Concentrations:	Circular Chemical Engineering Sustainable Biotechnology Engineering Physics for Sustainable Manufacturing Sustainable Mechanical Engineering
Mode(s) of study:	Full-time
Assessment group:	Circular Engineering (unique programme)
Awarded degree:	BSc.
Submission date NVAO:	1 May 2026

Description of the assessment

Organization

The BSc Circular Engineering (BSc CE) of Maastricht University (UM) is offered by the Faculty of Science and Engineering (FSE). FSE provides multidisciplinary education and research in a wide range of fields at several locations across Limburg. The faculty has multiple research departments and institutes spanning the STEM fields and aims to establish triple helix collaborations between UM, industry, and the public sector. It is the only UM Faculty present at all four Brightlands research and innovation campuses (Maastricht, Sittard-Geleen, Heerlen and Venlo). As of September 2026, FSE houses nine bachelor's programmes and seven master's programmes in which 3800 students are currently studying.

The BSc CE has between 30-50 students in each year of the programme, with a near fifty: fifty gender balance. Management of the programme is carried out by a programme director, who is supported by the central student affairs office at FSE. The programme director sits on the Management Team for Education, a consultative committee comprising the directors of the other FSE programmes and policy advisors, chaired by the FSE portfolio holder for education. The BSc CE has its own Education Programme Committee (EPC), consisting of three students and three academic staff members. The Board of Examiners (BoE) that oversees the BSc CE is also responsible for securing the quality of assessment of four other FSE programmes (the BSc Computer Science, the BSc Data Science and Artificial Intelligence, the MSc Artificial Intelligence and the MSc Data Science for Decision Making). The BoE is made up of academic staff members from several FSE research and academic departments.

Recommendations previous panel

The BSc CE was first accredited in 2020. This accreditation included a condition. In 2022, the same panel assessed this condition and concluded that it had been met. The 2020 panel also recommended that the programme actively monitor three issues. The programme reflected on these issues in the self-evaluation report and during the site visit. Based on this, the 2025 panel judges that sufficient attention has been paid to them. The panel explains its findings on the previous panel's key recommendations below.

The first recommendation of the 2020 panel was to include circular engineering more explicitly in the learning objectives of courses (course ILOs). In the self-evaluation report, the BSc CE explains that knowledge of circularity and its application to achieving sustainable techno-economic systems is in many ways a systems level outcome of the programme, built from a combination of explicit course intended learning outcomes and the design and structure of the programme. The first-year course Engineering in a Circular Economy establishes a foundation in sustainable/circular engineering, and the Lifecycle Assessment Project enables students to apply their theoretical knowledge of life-cycle approaches in practice. In the second year, students build on this in content-related courses and the 'Remake, Reuse, Repair, Recycle' course, where they learn to implement circular solutions in realistic scenarios. In the third year, each concentration includes a course with an explicit focus on circularity and circular engineering. The 2025 panel examined the curriculum design and course descriptions of the first-, second- and third-year courses, and established that a clear link to circular engineering is now evident in the course ILOs. Additionally, courses where circular engineering is not an explicit ILO incorporate cases and examples related to sustainability. In Standard 1 of this report, the 2025 panel gives the follow-up recommendation to also translate the unique circular identity of the programme more clearly into the programme level ILOs.

The 2020 panel also recommended reviewing and monitoring the complexity of materials offered in second- and third-year courses. The panel noted that some science and engineering courses were highly detailed and

almost at master's level, while others lacked depth in certain engineering areas. The 2025 panel examined course content and materials, concluding that courses generally align with the appropriate level. However, the panel also judges that the engineering content of certain courses, such as Plant Biotechnology, could be strengthened further. Therefore, Standard 2 of this report advises that reflection on the depth of engineering content should be more explicitly included in the course evaluation cycle. The panel found that the programme takes this evaluation cycle very seriously. Students receive a survey after each period and the programme director meets with each cohort twice a year to evaluate the programme. The Education Programme Committee (EPC) functions well, actively looking for areas for improvement in the evaluations and following up on them. Students and EPC members informed the panel that their opinions are highly valued by management and staff, and that staff actively seek feedback and ways to improve the programme further.

Finally, the 2020 panel urged the programme to exercise continuous vigilance when evaluating individual contributions to group work and peer assessments. The 2025 panel examined assessment procedures and discussed this issue with students and staff. The panel concludes that assessment design has been carefully considered, with sufficient attention paid to measuring individual progress and the risks involved in assessing group work, and that this sufficiently complies with the recommendation of the previous panel.

Standard 1. Intended learning outcomes

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

Findings

Profile

The BSc CE is a mission-driven programme that aims to educate students in engineering from the perspective of the transitions needed for a sustainable future. Graduates are equipped to address the technical challenges of sustainability and contribute to a sustainable future by analysing systems and designing solutions that require an interdisciplinary approach to the challenges of circular and sustainable economies. The curriculum is designed to train 'T-shaped' engineering professionals. Students acquire a solid foundation in process engineering, biotechnology, engineering physics and mechanical engineering while also following a range of elective modules and specialisms to explore their potential and ambitions in relation to sustainability. Students are actively encouraged to transcend existing boundaries, connecting various disciplines and stakeholders to provide technical analyses and solutions that facilitate the transition to a sustainable future. Strong connections with regional industries, such as the Brightlands Chemelot Campus and the Brightlands Campus Greenport Venlo, and a problem-based learning approach (PBL, see standard 2) facilitate this.

The panel studied the profile and concludes that is clearly articulated, relevant and topical. During the site visit, programme management explained that circularity should primarily be understood as intrinsic to the programme's DNA. This means that students are trained to become engineers with solid, content-based knowledge, while continuously studying subjects and engineering contexts through an interdisciplinary, sustainability-focused lens. The panel found that this engineering approach combined with Maastricht University's problem-based learning (PBL) approach, attracts a unique student population with a strong ambition to contribute to current sustainability challenges and connect theory and practice. Another defining feature of the BSc CE is that it gives students considerable flexibility and guidance in designing their own learning path based on personal preferences. This is achieved by offering a considerable number of

electives in year 2 that lead to interdisciplinary exit concentrations in the third year. The panel considers this approach to be well suited to the bachelor's phase, during which students should also have the opportunity to discover which subjects interest them most. As of 2025–26, the range of existing exit concentrations (Circular Chemical Engineering, Sustainable Biotechnology, and Engineering Physics for Sustainable Manufacturing) has been expanded to include a new concentration: Sustainable Mechanical Engineering. The panel considers this to be a valuable addition to the programme, as it directly addresses labour market demands for experts in sustainable manufacturing.

Intended learning outcomes

The BSc CE has formulated five sets of intended programme learning outcomes (ILOs, see appendix 1). These include the development of core academic and circular engineering knowledge, in-depth academic and engineering expertise in the field of circular engineering, the ability to integrate developments, contextual and global awareness, ethics, the ability to conduct research, and a wide range of skills such as communication, teamwork, leadership, project management and lifelong learning.

The panel studied the ILOs and judges them to be clear, realistic and appropriate for general engineering. It also found that they align with what is to be expected in an academic bachelor's programme in this domain and have been developed with reference to regional, national and international scientific and professional engineering standards, including the minimum curriculum requirements for various engineering programmes of the Accreditation Board for Engineering and Technology (ABET standards), the widely embraced CDIO framework for engineering education and the Dutch "Criteria for Academic Bachelor's and Master's Curricula" of the 4TU.Federation. To further demonstrate the academic level of a bachelor's degree, the programme matched the ILOs with the Dublin descriptor categories (knowledge, insight, judgement, communication, learning skills, and language proficiency), which relate to the bachelor's level of the Dutch Higher Education Qualifications Framework (NLQF 6). The panel appreciates that the ILOs focus not only on technical skills but also on professional skills needed to achieve circular transitions, and is satisfied that the ILOs align with what is expected from the professional field. The panel is also positive about the strong links between the programme and industrial stakeholders. The curriculum content and ILOs have been developed based on the needs of industry and input from professional stakeholders. The engineering content and topics covered in the programme are closely linked to the collaborative interests of academics and their research partners. This is reflected in the educational activities of the BSc CE at the Brightlands Chemelot Campus in Sittard-Geleen and the Brightlands Campus Greenport in Venlo. During the site visit, the panel established that the research teams responsible for designing the programme's education work at these locations and maintain good contact with industrial partners. They also provide programme management with regular feedback from industrial stakeholders on ILOs and the curriculum.

Although the panel is positive about the level and content of the ILOs, it also considers them to be rather generic. In part, this is understandable, because the ILOs should cover all four concentrations. Nonetheless, the panel considers that the ILOs would be even better if the programme's circular profile was more evident in them. Therefore, the panel recommends highlighting the programme's circular identity in at least one of them.

Considerations

The panel concludes that the profile of the programme is clearly articulated, relevant and timely. The programme's circular engineering approach combined with Maastricht University's problem-based learning (PBL) approach, attracts a unique student population with a strong ambition to contribute to current sustainability challenges and connect theory and practice. Another defining feature of the BSc CE is the

flexibility it offers students in discovering their own interests and designing their own learning path, which is well suited to an undergraduate programme.

The panel is positive about the level and content of the ILOs. They generally align with what is expected in an academic bachelor's programme in this field and have been developed in line with regional, national and international scientific and professional engineering standards. The panel appreciates that the ILOs focus not only on technical, but also on the professional skills needed to achieve circular transitions. To further improve the ILOs, the panel recommends emphasising the programme's circular identity in at least one of them.

Conclusion

The panel concludes that the programme meets standard 1.

Standard 2. Teaching-learning environment

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

Findings

Educational approach

The BSc CE uses an active learning approach based on the problem-based learning (PBL) method of Maastricht University (UM). According to this PBL method, students collectively analyse and discuss problems, exchange knowledge and cultural experience and learn how to formulate solutions for scientific and social issues. PBL includes the application of student-centred educational methods based on four principles (CCCS):

1. Learning is based on cases in a context meaningful to the student (Contextual learning);
2. Active knowledge acquirement through student engagement, which builds new knowledge on/in their existing frame of reference (Constructive learning);
3. Learning from and with others (Collaborative learning);
4. The learners select, manage and assess their own learning activities (Self-directed learning).

In order to gain a good understanding of the PBL/CCCS approach in the BSc CE programme, the panel requested additional course materials and discussed PBL/CCCS with students and lecturers. The panel found that students as well as staff are generally enthusiastic about PBL/CCCS and appreciate it. Students value its impact on overall quality of teaching, in particular the attention it gives to contextualization, application of theoretical knowledge and interactive learning in small scale classes using a mix of working methods. The panel shares the general appreciation of PBL and judges it to be well suited to an interdisciplinary and mission-driven programme such as the BSc CE.

During the site visit, the applicability of the PBL/CCCS method for education in STEM fields and specific topics within the BSc CE were discussed in more detail. The panel wondered whether certain science subjects (e.g., mathematics and physics) of the programme may require a different approach than PBL/CCCS. It was pleased to find that management does not impose a rigid interpretation of it, but recognizes that multiple formats can enact the spirit of PBL/CCCS meaningfully and that it is essential that approaches at course level are appropriate for the course ILOs. This is convincingly confirmed by a draft scientific paper provided to the panel showcasing a large number of different and creative ways that PBL/CCCS is implemented by FSE programmes, including the BSc CE.

In the student chapter of the self-evaluation report and during the site visit, students mentioned that many lecturers are passionate about problem-based learning and responsive to feedback, but others sometimes struggle with it. The panel concludes that cross-pollination of best practices with PBL/CCCS requires ongoing attention. During the visit, the panel found that programme management and staff organize various sessions each year for continuous professional development and to discuss alignment between courses (e.g. Education Development and Innovation Talks, teacher meetings and workshops). The panel suggests also using these sessions to share best practices on PBL/CCCS between teachers.

Curriculum structure and content

The BSc CE is a three-year, full-time programme (180 EC). The curriculum consists of three types of modules (content courses, skills courses and projects) and is spread over six semesters. Each semester comprises two seven-week periods, each worth 12.5 EC, during which students typically take two 5 EC content courses and one 2.5 EC skills course. Between each content period, there is a reflection week. Each semester in the first two years concludes with a three-week project period, during which students complete either a life-cycle assessment project or a team design project worth 5 EC.

The curriculum is divided into four phases: the compulsory core (semesters 1 and 2); electives (semesters 3 and 4); concentrations (semester 5); and bachelor's thesis research (BTR, semester 6). During the compulsory core phase, students study mathematics, lifecycle assessment, applied physics, chemistry, biotechnology and core skills for study, project work, laboratories and computing. The elective phase then allows students to explore their personal interests and prepare for further specialization in semester 5. This phase includes 40 EC of elective content courses and 10 EC of elective skills courses. Students also participate in two compulsory design projects, each worth 5 EC. Further specialization based on individual interests takes place in semester 5 with the selection of a coherent set of courses in one of the following four areas of concentration: Circular Chemical Engineering, Sustainable Biotechnology, Engineering Physics for Sustainable Manufacturing, and Sustainable Mechanical Engineering. Each 'concentration' (30 EC) consists of four 5 EC content courses (20 EC), two 2.5 EC skills courses (5 EC), and one project (5 EC). Alongside each concentration, there is a 5 EC course on ethical and philosophical reflections. For a complete overview of the curriculum, see Appendix 2.

The panel discussed the programme structure with students and concludes that it is clear to them. The panel also studied the course catalogue and materials from a selection of modules. It found that there is a clear link between the courses and the programme ILOs and that didactic methods used align with the PBL/CCCS philosophy. The panel judges that the courses generally align with the expected level. However, the engineering content of some courses (e.g. Plant Biotechnology) could be strengthened further. The panel advises including reflection on the depth of engineering content more explicitly in the course evaluation cycle. In the panel's view, the curriculum demonstrates a high level of relevance by integrating theoretical knowledge with real-world industrial challenges, evidenced by a clear progression from foundational STEM disciplines to complex engineering systems. In line with the programme's profile, courses not only address technical aspects but also challenge students to critically and ethically evaluate existing technologies. As a point for further development, the panel advises the programme to address ethics in a more integrated way, starting in Year 1. The first year of the programme consists of a solid core curriculum, while the second and third years offer a wide choice of interesting electives and four concentrations with relevant course packages.

The elective space in the second year of the programme is substantial (50 EC). In addition, students must take an elective skills course (2.5 EC) linked to their chosen third-year concentration. During the site visit, the panel discussed with students how they navigate this. Students explained that they highly value the amount

of elective space available to them and feel well supported in making choices. Students must already start building their curriculum in the first year. This process is guided by the programme director, the study adviser, and lecturers who are approachable. In addition, the programme organizes twice-yearly meetings to inform students about the course structure and elective modules, and how these align with the different concentrations. According to the students, it is relatively easy to adjust choices if they prefer to choose another concentration. A small improvement point mentioned by the students is to have a little bit more build-up to the different concentrations in the curriculum, particularly in the first year and the first half of the second year. The panel suggests addressing this by referring to the relevance of specific topics to different concentrations more explicitly during lectures.

The programme concludes with the Bachelor's Thesis Research (BTR, 25 EC). Students receive a briefing on this in March of the second year explaining the process and objectives. They then submit their topic in November of their third year of study. The panel studied the thesis manual and found that the thesis process and guidance are clearly communicated. The thesis report must be written in English, which is in line with the choice of the programme to use English as its language of instruction. Students can also do their BTR at another university, at a research institute or company. In these cases, day to day supervision can be done by an external supervisor, but assessment is always done by two UM assessors. The panel agrees that this is important to ensure that all students are assessed equally. To stimulate more uniformity in quality of the theses (see: Standard 4), the panel suggests that the programme develops a one-page document with general guidelines for the theses describing the various components that must be included and the minimum requirements that apply to them. This would be useful also in specifying to students the expectations in terms of supervision for all (external and internal) supervisors.

Language of instruction and admissions

The programme has an English name and English is the language of instruction. The panel agrees with these choices and the arguments behind them, namely that English is the language of international business and technology, and that the challenge of transitioning to a circular economy is an international one.

Students are eligible for admission to the programme if they hold a Dutch VWO diploma with a 'Natuur en Techniek' or 'Natuur en Gezondheid' including Mathematics B and Physics profile. International applicants and Dutch students in international schools must hold the equivalent qualifications. As the programme is taught in English, students must also demonstrate adequate proficiency in this language. Dutch students are assumed to meet this requirement. International students must demonstrate a minimum English proficiency level corresponding to academic IELTS 6.0. The panel concludes that the admission requirements are appropriate.

Between 2021-22 and 2024-25, the programme had an average intake of 39 students. Following an initial increase in student numbers in 2022-23, there has been a decline in recent years. The current debate on internationalization in the Netherlands and the ban on actively recruiting international students has contributed to this. The panel regrets this situation because the Circular Engineering programme addresses the important societal issue of sustainability and is situated in a unique location close to industry and the Dutch border. The panel found that recruitment activities within the Netherlands are numerous and varied, these include an active information campaign in secondary education about the programme and collecting stories from graduates about their experiences in the programme.

Approach to GenAI in education

The BSc CE follows UM and FSE policies and guidelines for using GenAI applications. The general rule at UM and FSE is that teaching and learning are designed assuming that GenAI is available and used. Students may

use GenAI applications by default, provided academic integrity is maintained and their own achievement remains assessable. This means that explicit restrictions or conditions are set in syllabi and assessment instructions whenever the use of GenAI would undermine learning or assessment. It also means that programmes can use GenAI where relevant in education, research and operations, while striving for safe and responsible use of GenAI tools and compliance with relevant laws and regulations. Other important pillars of UM and FSE GenAI policies and guidelines include equal access to AI applications and equal opportunities for students, support of both teaching staff and students in their use of GenAI through training, professionalisation activities and instructions, and regular evaluation of the use of GenAI.

The panel concludes that the use of GenAI has been carefully considered, with clear guidelines and room for lecturers to make their own decisions at course level. It found that FSE is currently conducting a survey about the knowledge and preferences of staff about GenAI and will adapt policies, procedures and professionalization activities based on this. The panel appreciates this initiative, also as proof that policies and procedures on GenAI are indeed subject to continuous evaluation and improvement. During the site visit, the panel learned from students that they do not always know where to go or what to do if they suspect unauthorized use of GenAI by their peers or if they have questions about using GenAI (e.g. about GenAI facilities at UM and regulations). The panel therefore suggests continuing to invest in communication about this, as well as in lecturers' knowledge of the relevant rules, procedures, possibilities and best practices.

Feasibility

The programme has a binding study advice (BSA) in the first year. Students in the programme must obtain a minimum of 45 EC credits at the end of the first year. Students with fewer EC have to leave the programme. The panel studied drop-out rates in the first year and after the first year for the academic cohorts 2022-2023 and 2023-2024. Given the relatively small number of students on the programme until this moment, it is hard to draw conclusions about the feasibility of the programme. However, during the visit, students were positive about the feasibility of the programme and the panel has no specific concerns in this regard: the student support system is robust, teachers are approachable and study progress is actively monitored. The panel also noticed positively that for high-workload courses such as Calculus, students have access to video clips and self-study modules on Canvas, allowing them to prepare at their own pace before attending tutorials.

Guidance, support and studying with a disability

The BSc CE employs a study advisor who, in collaboration with the Office of Student Affairs and the Board of Examiners, advises students on workload, study options, study methods and effectiveness. If necessary, the study advisor refers students to other services for support. The study advisor is introduced to students at the introduction day and available at the home location of the programme four days a week. Students also receive academic guidance on elective choice, study concentrations and further study in the form of information sessions and one-on-one consultation. Information about academic and study advising is provided via an intranet page and Canvas.

In the student chapter and during the site visit, students expressed positive views about the overall level of guidance and support by the programme. BSc CE is a small-scale programme allowing for easy contact between students and lecturers, the student affairs team is easily accessible and the programme director has an open door policy for students. Students mentioned that programme staff is open to feedback and take them seriously.

When dealing with students studying with a disability and/or chronic illness, the programme follows UM policy. In line with this, students are required to report their disability to the central UM Disability Support

Office, which advises the Board of Examiners about the provisions needed. Requests by students in the BSc CE are mainly related to dyslexia and anxiety. In the student chapter, students report that they feel well-supported with their disabilities and the process for receiving support is easy and straightforward. Students confirmed this during the site visit.

Teaching staff

The programme is taught by staff from all departments of FSE. The panel studied an overview of staff and found that they are well-qualified in the subjects that they teach. Nearly all staff have a PhD and all staff either have a University Teaching Qualification (UTQ) or are in the process of obtaining it. In addition, the programme director completed the Inspiring Academic Leadership course for senior lecturers and programme directors. The panel learned that after achieving this UTQ, academic staff are required to engage meaningfully in education-focussed professional development activities (at least 16 hours a year). This sufficiently ensures continuous learning.

During the visit, the panel discussed the size of the staff and internal cohesion of the teaching team with programme management. The panel and management agreed that the size of the staff will have to increase if intake numbers grow. The panel has been informed that FSE can make financial provisions for this, if necessary. The panel was pleased to learn that programme management plans to set up a more solid core team in the first year and appoint academic team leads for the concentrations in the upcoming years, in order to strengthen internal cohesion and better accommodate the diverse backgrounds of students starting the programme in the first year. The panel strongly encourages the programme to continue with this.

Programme-specific facilities

The home location of the BSc CE is FSE's main building at the Paul Henri-Spaaklaan 1. Classroom-based courses often use tutorial rooms and large classrooms here. The main practical facilities are at the Brightlands Chemelot Campus. This location has laboratory and workshop space, including a Design and Fabrication site consisting of a workshop, stores, testing and printing laboratory and a design computing room. The programme also makes use of other locations with specific practical facilities that students require, such as the practical physics laboratories at the Duboisdomein 30 in Maastricht and the Ammonium Sulfate Pilot Plant facility of Vista College in Sittard.

The panel visited both the main Paul Henri-Spaaklaan and the Brightlands Chemelot Campus and concludes that the facilities are excellent and well-tailored to the needs of the BSc CE. As of academic year 2023-2024, the BSc CE also has its own study association, Möbius. During the site visit, students told the panel that Möbius is very active and organizes a variety of events throughout the year.

Considerations

The PBL/CCSS educational approach of Maastricht University is appreciated by students and staff. It has been carefully translated into the BSc CE, recognizing that approaches must always be suitable for course ILOs and that multiple formats can enact the spirit of PBL/CCCS meaningfully. The BSc CE curriculum demonstrates a high level of relevance and is well structured, with a clear link between courses and programme ILOs. It features a solid core curriculum in the first year, as well as a wide and interesting selection of electives and concentrations. The extensive freedom of choice in the second year is accompanied by a good support structure for making choices leading up to the concentration packages in the third year. The thesis phase is well designed and communicated clearly to students.

The programme's admission requirements are appropriate. Students are satisfied with the support structures in place, including those for students with disabilities, and feel that their concerns are being

addressed. They appreciate the short communication lines with lecturers and the programme director's open-door policy. The staff are well-qualified in terms of both content expertise and didactics. The facilities are excellent and well-tailored to the programme's needs.

Conclusion

The panel concludes that the programme meets standard 2.

Standard 3. Student assessment

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

Findings

System of assessment

The BSc CE follows the UM vision on assessment, which is an integral part of the UM educational concept of CCCS/PBL. According to this concept, assessment is a meaningful part of the student's learning process and should provide opportunities for students to reflect on and learn from their assessments by using timely and specific feedback to guide their learning. In practice, assessment design is coordinated at programme level to ensure constructive alignment with the ILOs and teaching and learning activities. This involves embedding three types of assessment: assessment of learning (evaluating achievement of the ILOs), assessment for learning (using formative evaluation) and assessment as learning (monitoring and reflecting on progress). Finally, assessments should be valid, reliable and transparent, and provide opportunities for student engagement (e.g. peer feedback, inspection hours, and student-led assessment design).

The panel studied the assessment plan of the programme, assessments for six courses and, at the request of the panel, grade analyses for two courses. It found that each course includes at least two assessment moments, which is highly recommendable. The assessment forms and rubrics used are clear. During the site visit, panel and staff discussed that success rates and grading of one of the two selected courses were high. There can be a variety of explanations for this, such as higher levels of support from teachers and a practical focus of the course (see: Quality assurance of assessment). The assessment methods used align with the UM vision of assessment of/as/for learning and active student engagement. These include written and oral exams, written assignments and papers, lab reports, designs, presentations, and peer feedback and assessments.

During the site visit, the panel spoke with students and teachers about group work and how it is assessed. The panel found that group work accounts for a maximum of 30% of the summative grade in content and skills courses, ensuring that students are assessed primarily on their individual competencies and achievements. Additionally, group work is evaluated to include the group process and the contributions of individual group members, for instance through teacher and peer evaluations of collaboration and individual contributions. Both students and staff highly value group work as part of the programme because they consider it an effective means of preparing students for the labour market, where teamwork is also required. The panel agrees with this and concludes that the assessment of group work has been carefully considered and designed.

Assessment of the Bachelor Thesis Research (BTR)

Students complete the programme by writing a Bachelor's Thesis Research (BTR) project. This consists of several products: a research proposal, a midterm assessment of practical work, a final assessment of practical work, a thesis and a final presentation. The thesis and final presentation contribute most

significantly to the student's final grade. The BTR involves several staged assessments. First, students must receive formative approval for their chosen topic and examiner team. Then, they receive a summative grade for their proposal or project description (10% of the final grade), followed by mid-term assessments of their practical work (10%), their written thesis report (25%), their practical work (25%), and their presentation at the Bachelor's Conference (30%). Grading at each stage follows a standard rubric and is always conducted by two UM examiners. The first examiner is also the principal research supervisor. The second examiner provides an independent assessment. If there is a discrepancy of more than 1.5 points between the grades assigned to the thesis by the first and second examiners, a third assessor (a UM staff member not directly involved with the research) may be appointed to resolve the difference. In the case of external thesis projects, students also have an external research supervisor. This supervisor is responsible for daily supervision at the external site and may be asked to act as a guest assessor in the Bachelor's Conference jury.

The panel concludes that the thesis assessment process is clearly described in the thesis manual and well considered. The panel studied a list of all BTR products for the 2023–24 and 2024–25 academic years, as well as six BTR-files with all products, nine BTR-files with only the thesis and the final presentation, and the corresponding completed assessment rubrics (See Procedure). The panel found that the assessment rubrics are reasonably designed and completed with sufficient care by thesis assessors. However, BTR grades are generally on the high side (see Quality Assurance of Assessment). Therefore, the panel advises to render the grading rubric a bit more specific and to calibrate the markers on a regular basis to ensure common understanding and interpretation. This would also ensure that the grading are not artificially inflated by subjective interpretation of a generically worded rubric.

Quality assurance of assessment

The panel discussed with management and the Board of Examiners (BoE) how they ensure the quality of assessments and grades on the programme. They explained that the primary responsibility for assessment quality lies with the programme director, who coordinates assessment quality at programme level, and with the examiners of individual modules. To safeguard the quality of module examiners, the Board of Examiners (BoE) appoints them based on their experience and background. Examiners must have obtained a UTQ or be in the process of obtaining one in a minority of cases. When designing assessments, examiners must consider assessment regulations, including the requirement to inform students clearly about assessments using a course assessment plan published in the course manual. The panel concludes that responsibilities for ensuring assessment quality are clearly assigned and that the relevant regulations are suitable and transparent.

Quality of assessment in the BSc CE programme is safeguarded by a Board of Examiners (BoE) that is also responsible for securing the quality of assessment in the bachelor's programmes Computer Science and Data Science and Artificial Intelligence, and the master's programmes Artificial Intelligence and Data Science for Decision Making of FSE. It is made up of academic staff members from several FSE research and academic departments. During the visit, the panel discussed with members of the BoE how the BoE fulfils its tasks. It found that, among other things, the BoE investigates irregularities and fraud, handles special requests from students and signals urgent issues regarding assessment quality. It also screens course manuals and assessment plans, evaluates the outcomes of regular course grade analysis and assesses the quality of final projects by means of random samples of low, medium, and high-scoring final projects. Outcomes of these activities and suggestions for improvement for the following year are recorded in an annual report. The panel studied the BoE's annual reports for 2023-24 and 2024-25. On this basis, the panel concludes that the BoE is performing its tasks adequately. The panel however also concludes that process and outcomes of activities in the areas of course grade analysis and screenings of course assessment and theses should be

included in the reports in a more specific way. Therefore, the panel recommends making findings and recommended follow-up actions of grade analysis, assessment screenings and thesis checks more visible in the annual reports of the Board of Examiners.

During the site visit, the panel discussed the scope and workload of the BoE with management and BoE members. It found that the BoE's workload is currently manageable, but growing, partly due to the emergence of GenAI. Management shared its consideration to place the BSc CE under a different BoE or to create a new BoE for the BSc CE. The panel supports this plan and encourages management to proceed with it.

Considerations

Assessment in the programme is generally well-designed, with sufficient attention paid to measuring individual progress and the risks involved in assessing group work. Assessment methods align with the UM vision of assessment and are sufficiently varied. The panel and staff discussed that grades are high in one selected course and the panel noted this for BTR projects in particular. Therefore, the panel recommends that the programme continues to monitor this, to render the BTR grading rubric a bit more specific and to calibrate the grades on a regular basis to ensure common understanding and interpretation. The panel concludes that responsibilities for ensuring assessment quality are clearly assigned, and that the relevant regulations are suitable and transparent. While the BoE is performing its tasks adequately, the process and outcomes of activities in the areas of course grade analysis and screenings of course assessments and theses should be reported more explicitly. Therefore, the panel recommends that the findings and recommended follow-up actions of these activities be made more visible in the annual BoE reports.

Conclusion

The panel concludes that the programme meets standard 3.

Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Quality of the achieved learning outcomes

The panel studied graduation files of 15 graduates from the programme. Based on this sample, the panel concludes that the intended learning outcomes are achieved. Although thesis grades are generally on the high side (see Standard 3), the panel judges that all selected theses and presentations are of a satisfactory standard. The general level of the graduation files is in line with what may be expected from a bachelor's programme in this field and the theses successfully bridge the gap between traditional engineering (e.g., chemical or materials science) and circular economy objectives, such as life-cycle assessment (LCA) and sustainable process design. The panel did notice that essential elements of research reports are not always developed to the same extent. Therefore, the panel suggests in Standard 2 that the programme develops a small additional document with guidelines clearly articulating expected elements of thesis and the depth to which they must be addressed. In Standard 3, this should then be reflected explicitly in the marking rubric, which should be calibrated on a regular basis to ensure common understanding and interpretation. This would also prevent that the grades are artificially inflated by subjective interpretation of a generically worded rubric.

Performance of graduates

The panel received an overview of the destinations of the first graduates of the programme. This shows that, until now, most graduates continue their academic career with a master's degree and successfully find their way to master's programmes. Follow-up degrees include programmes at renowned universities in the Netherlands and abroad, such as TU Delft, TU Munich and the Technical University of Denmark. The panel concludes that first experiences present a promising picture of the master's programmes that graduates can enrol in, but also that the number of graduates (n=13) is still too low to make any final statements on this. Further defining which master's programmes graduates can gain direct access to, and which programmes (possibly) require a bridging programme, could potentially provide students with even better support in finding a suitable master's programme and help the programme to define its niche focus in competition with other engineering programmes in the region. The panel therefore encourages the programme to continue its activities in this respect. A follow-up master's programme in Circular Engineering would also be a very interesting option for BSc CE graduates. The panel encourages the programme to continue exploring the possibilities for this.

Considerations

The panel concludes that students achieve the intended learning outcomes of the programme. Until now, graduates have been well placed to enter relevant master's programmes.

Conclusion

The panel concludes that the programme meets standard 4.

General conclusion

The panel's judges that the bachelor's programme Circular Engineering meets all four standards. The panel's assessment of the programme is therefore positive.

Recommendations

1. Highlight the circular identity of the BSc CE in at least one programme intended learning outcome.
2. Continue close monitoring of course success rates and grading, also in the BTR project, and adjust assessment when necessary.
3. Make findings and recommended follow-up actions of grade analysis, assessment screenings and thesis checks more visible in the annual reports of the Board of Examiners.

Appendix 1. Intended learning outcomes

ILO cluster	Detailed ILOs	Dublin Descriptor
1. Students have a breadth of academic and engineering knowledge	1.1 CORE KNOWLEDGE Students have knowledge of the basic concepts within science, technology, engineering and mathematics (STEM), including the nature of academic knowledge and theory forming development	1
	1.2 CIRCULAR ENGINEERING KNOWLEDGE Students understand the opportunities and challenges for science and engineering in a dynamic world with increasing focus on circularity and can integrate the concepts of a circular economy, sciences and engineering into a single discipline: circular engineering	1
	1.3 ACADEMIC AND ENGINEERING KNOWLEDGE Students have basic knowledge of the engineering design cycle and understand and can apply relevant models, theories, methods and techniques in the STEM disciplines	1, 2
2. Students have in-depth academic and engineering expertise in the field of circular engineering	2.1 IN-DEPTH KNOWLEDGE Students have academic and engineering knowledge of disciplines which form the basis of circular engineering and they are able to place the knowledge in a broader context: - Sciences: <i>physics, chemistry and biology</i>; - Technology: <i>biotechnology, chemical process technology, manufacturing technology</i>; - Engineering: <i>design and systems engineering, thermodynamics, control engineering, regulatory and industry standards</i>; - Sustainability: <i>product life cycle and footprint</i>; - Mathematics: <i>quantitative modelling, simulation and statistics</i>	1, 2, 3
	2.2 CONDUCT RESEARCH Students can formulate and analyse a circular engineering problem (including systems' boundaries) and assess which expertise, design strategy, materials, laboratory infrastructure and experiments are required to solve this problem at a basic level in an efficient manner through scientific research	2, 3
	2.3 CONDUCT DESIGN Students have basic knowledge of methods and tools for modelling and designing to execute an engineering design cycle including synthetic activities to solve circular engineering problems at a basic level	2, 3
	2.4 INTEGRATE DEVELOPMENTS Students are aware of the effects of developments and new insights to running academic and engineering processes and can integrate these to benefit problem solving	2, 3
	2.5 PREPAREDNESS Students are adequately prepared for relevant graduate programmes	1, 2, 3, 4, 5
3. Students have a scientific and intellectual attitude	3.1 CRITICAL THINKING Students demonstrate critical thinking, a logic line of reasoning and an adequate questioning strategy to analyse and/or solve problems	2, 3
	3.2 SCIENTIFIC ATTITUDE Students can review, expand and apply the acquired knowledge to contribute to the generation of new knowledge and viewpoints	2, 3
	3.3 REFLECTION Students can critically reflect on their own activities and conclusions and steer their learning process	3
	3.4 ANALYTICAL AWARENESS Students are aware of orders of magnitudes and can work at different levels of abstraction	3
	3.5 LIFE-LONG LEARNING Students can act as a junior professional by demonstrating motivation, perseverance, accuracy and independence thereby having the attitude and skills required for life-long professional growth and professional responsibility	5

4. Students have in-depth insights in the societal and environmental contexts in which they perform	4.1 CONTEXTUAL AWARENESS Students can understand and apply the professional, social, cultural and environmental contexts within which they perform	1, 3
	4.2 GLOBAL AWARENESS Students have knowledge of the most important globalisation developments and relationships in sustainability, technology and society	1, 3
	4.3 SOCIETAL RESPONSIBILITY Students are aware of the societal and environmental implications of new developments in science and engineering and specifically for circular engineering	3
	4.4 ETHICS Students can analyse ethical issues in academic and social environments in relation to their professional activities and to oversee the implications of their decisions and work as circular engineers	3
5. Students have highly developed (inter)personal skills	5.1 LEARNING Students can quickly adapt to new emerging theories and techniques in the field of circular engineering because of their ability to develop and develop scientific and engineering knowledge through study	5
	5.2 COMMUNICATION Students can communicate the result of their learning, thinking and decision-making at an international level to professionals and a non-specialised public	4
	5.3 TEAMWORK Students can share expertise and work effectively in an interdisciplinary team existing of members with different academic, socio-cultural and national backgrounds or other social arrangements on solving problems and accomplishing tasks	4, 5
	5.4 LEADERSHIP Students can lead a multidisciplinary team of individuals and the ability to take adequate decisions within team	4, 5
	5.5 PROJECT MANAGEMENT Students can execute a project in systematic manner including prioritisation of tasks, maintaining focus and taking responsibility, dealing with limited resources and time, risk management and trade-offs, and adequate decision-making	2, 4, 5

Appendix 2. Programme curriculum

The first year of the programme contains eight 5 ECTS content courses, four 2.5 ECTS skills courses and two 5 ECTS projects. Students follow a core of mathematics, lifecycle assessment, applied physics, chemistry, biotechnology, and core skills for study, project work, laboratories and computing (see table 2).

Table 2: Curriculum structure and core courses offered during year 1

		Courses		Skills	
P ₁	Core 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN1001	Engineering in a Circular Economy	SKI1101	Academic Skills and Project Management
		CEN1002	Calculus		
P ₂	Core 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN1003	Fundamentals of Engineering	SKI1102	Basic Programming Skills
		CEN1004	Linear Algebra		
P ₃	Core 1 Project (5 ECTS)	PRO1110	Life Cycle Assessment Project		
P ₄	Core 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN1005	Chemistry and Chemical Engineering	SKI1103	Physics and Electronics Laboratory Skills
		CEN1008	Multivariable Calculus		
P ₅	Core 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN1006	Biotechnology	SKI1104	Chemistry and Biology Laboratory Skills
		CEN1007	Thermodynamics and Engineering Physics		
P ₆	Core 1 Project (5 ECTS)	PRO2110	Design Project		

Each semester in the first two years ends with a project period of three weeks (in 2021 and 2022 this period was four weeks long). During the project period students complete a life-cycle assessment project or a team design project of 5 ECTS.

Table 3: Curriculum structure listing all electives offered in year 2

		Courses		Skills	
P ₁	Electives 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN2001	Organic Chemistry	SKI2106	Advanced Programming Skills
		CEN2007	Fluid Mechanics	SKI2107	Organic Chemistry Skills
		CEN2008	Energy Systems	SKI2108	Plant Biology Skills
		CEN2013	Polymeric Materials		
P ₂	Electives 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN2005	Imaging Engineering	SKI2101	Statistics Skills
		CEN2009	Sustainable Food Production	SKI2110	Polymer Processing Skills
		CEN2022	Biobased Materials		
		CEN2025	Numerical Methods		
P ₃	Core 1 Project (5 ECTS)	PRO2111	Design Project 2		
P ₄	Electives 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN2003	Biochemistry	SKI2102	Bioinformatics Skills
		CEN2015	Sustainable Agronomy	SKI2113	Fabrication and Design Skills
		CEN2026	Mechanics of Complex Fluids		
		MAT2008	Differential Equations		
P ₅	Electives 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN2006	Remake, Reuse, Repair, Recycle	SKI2105	Genetics Skills
		CEN2016	Data Science and Analysis	SKI2112	Signal Processing and Control Skills
		CEN2018	Circular Business Development	SKI2114	Analytical and Physical Chemistry Skills
		CEN2019	Heat and Mass Transfer		
		CEN2020	Genetics and Cell Biology		
		CEN2021	Electronics Engineering		
P ₆	Core 1 Project (5 ECTS)	PRO2112	Design Project 3		

During the final year, the study is split approximately into two halves with semester one for the completion of the chosen course concentration, e.g. Circular Chemical Engineering, and the general ethics course. In the second semester, students complete a bachelor's thesis research project (BTR) of 25 ECTS.

The four interdisciplinary exit concentrations within the programme are:

- 1 | Circular Chemical Engineering
- 2 | Sustainable Biotechnology
- 3 | Engineering Physics for Sustainable Manufacturing
- 4 | Sustainable Mechanical Engineering (offered as of academic year 2025-2026)

Table 4: Curriculum structure of year 3 depicting the four concentrations and thesis, along with semester-long ethics and philosophy course.

		Circular Chemical Engineering	Sustainable Biotechnology	Sustainable Mechanical Engineering	Engineering Physics for Sustainable Manufacturing
P1	Concentrations 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN3001 Chemical Engineering Thermodynamics and Kinetics CEN3003 Separations Processes SKI3102 Unit Operations Skills	CEN3010 Gene Technology CEN3015 Biological Separations SKI3103 Biotechnology Skills	CEN3020 Mechanical Physics CEN3030 Engineering Mechanics SKI3105 Mechanical Design Skills	CEN3020 Mechanical Physics CEN3021 Sensors, Instrumentation and Measurement SKI3105 Mechanical Design Skills
P2	Concentrations 2 Courses (5 ECTS) 1 Skill (2.5 ECTS)	CEN3002 Reactor Engineering CEN3004 Chemical Plant Design SKI3101 Industrial Process Design Skills	CEN3012 Plant Biotechnology CEN3013 Bioreactors SKI3104 Microbiology and Fermentations Skills	CEN3022 Materials and Production Engineering CEN3031 Process and Product Engineering SKI3107 Finite Element Skills	CEN3022 Materials and Production Engineering CEN3023 Advanced Electronics and Sensor Technology SKI3106 Advanced Electronics Skills
P3	Concentrations 1 Project (5 ECTS)	CEN3005 Circular Process Design and Control	CEN3014 Biotechnology for Sustainable Processes	CEN3024 Product and Process Design for Sustainable Manufacturing	CEN3024 Product and Process Design for Sustainable Manufacturing
P1-3	Core 1 Course (5 ECTS)	CEN3006 Ethical and Philosophical Reflections			
P4-6	Core 1 Bachelor Thesis	BTH3010 Bachelor Thesis Research			

Appendix 3. Programme of the site visit

Day 0:

12 December 2025, online

Consultation hour and internal preparation session by the panel

Day 1:

Monday 12 January 2026, Chemelot, Urmonderbaan 22, Sittard-Geleen

16.30-17.15

**Welcome by programme director;
Tour of the teaching facilities for BSc CE at Chemelot**

Programme director
Student tour guide
Educational coordinator
Lab Coordinator
CCE staff members

Tour route – 15 minutes each:

1. CE teaching labs and facilities - explained by Programme director and Lab coordinator
2. Tour of the plasma facilities (Circular Chemical Engineering department) - explained by CCE staff member
3. Tour of the plastics hall (Circular Chemical Engineering department) - explained by CCE staff member

Day 2:

Tuesday 13 January 2026, Paul-Henri Spaaklaan 1 (PHS1), Maastricht

08.45-09.00

Welcome by programme director and policy advisors; panel gets seated in interview room

09.00-10.00

Interview programme management and faculty management

Faculty dean FSE
Vice-dean education FSE
Programme director

10.00-10.45

Internal panel session

10.45-11.30

Interview BSc students (incl. alumni and EPC member(s))

Second-year student, author student chapter, EPC Member
Second-year student
Second-year student, EPC Member
Third-year student – concentration: Circular Chemical Engineering, author student chapter, EPC Vice-Chair
Third-year student – concentration: Sustainable Biotechnology
Soon-to-be alumnus – concentration: Circular Chemical Engineering (needs to complete one last project in January 2026, thesis done)
Alumnus, author student chapter

11.30-12.30

Internal panel session and lunch

12.30-13.15

Interview teaching staff (incl. EPC member(s))

	Assistant professor and EPC Chair Associate professor Assistant professor Assistant professor Lecturer Professor of Circular Plastics Associate professor Assistant professor and EPC Member
13.15-13.30	Short break
13.30-14.00	Interview Board of Examiners BoE Member and lecturer BoE Member and assistant professor BoE Member and assistant professor
14.00-14.30	Internal panel session
14.30-15.15	Concluding interview programme management and faculty management Vice-dean education FSE Programme director
15.15-15.45	Internal panel session
15.45-16.45	Development dialogue Programme director Vice-dean education FSE Minute-taker: policy advisor
16.45-17.00	Oral feedback from panel (announcement preliminary judgement) All participants are invited

Appendix 4. Materials

Prior to the site visit, the panel studied graduation products from 15 graduates. Information on the selected products is available from Academion upon request.

The panel also studied other materials, which included:

- Self-evaluation report BSc Circular Engineering (Re-Accreditation 2026).
- Appendices Self-evaluation report:
 - Intended learning outcomes and Dublin descriptors.
 - Assessment matrix.
 - Assessment Programme.
 - Project examples & company partners.
 - Graduate destinations.
 - Overview Academic staff.
 - Overview Department Abbreviations.
 - Academic year calendar.
 - Examples of curricula followed by students.
 - Overview of electives.
 - Overview of concentration-specific courses.
 - Overview of external thesis hosts.
 - ABET General Criteria for Baccalaureate Level Programs.
- Education and Examination Regulations Bachelor of Science Programme Circular Engineering 2025-2026 (Maastricht, August 2025).
- PDCA cycles for education at FSE: Quality assurance policy (November 2023).
- FSE policy framework for the use of generative AI in education (Effective 21 October 2025)
- Rules and Regulations Bachelor of Science Programme Circular Engineering 2025-2026 (Maastricht, 29 August 2025).
- Policy Framework Generative Artificial Intelligence (Maastricht University, December 2024).
- Policy plan Studying with a disability and/or chronic illness Maastricht University 2023–2026.
- The UM Vision on Assessment
- Organizational chart FSE
- Online course catalogue BSc Circular Engineering 2025-2026
- Samples of course materials (incl. assessments and course evaluations):
 - CEN1002 Calculus
 - CEN2006 Remake, Reuse, Repair, Recycle
 - CEN3002 Reactor Engineering
 - CEN3012 Plant Biotechnology
 - SKI2101 Statistics Skills
 - Example briefs for design projects
- Annual Reports Education Programme Committee 2023-2024 and 2024-2025, including appendices
- Annual Reports Board of Examiners 2023-2024 and 2024-2025
- Weblinks for accreditation BSc Circular Engineering, including:
 - General information about the organization of Maastricht University
 - Information about Problem-Based Learning (PBL) at Maastricht University
 - A video about the Faculty of Science and Engineering (FSE)
 - An Instagram account of Study Association Möbius

- Information on Brightlands Campuses:
 - Maastricht Health Campus
 - Chemelot Campus
 - Smart Services Campus
 - Greenport Venlo Campus
- Additional information (upon panel request):
 - Materials about PBL and CCCS in practice:
 - CEN3002 Reactor Engineering tutorial task 2 and five examples of student work
 - CEN3002 Reactor Engineering tutorial task 6 and five examples of student work
 - CEN3013 Bioreactors Course Manual and Information on Tutorials 1-9
 - Draft publication CCCS learning at FSE (expected in 2026)
 - Grade analysis
 - CEN 3003 Separation Processes - Grade analysis
 - SKI1102 Basic Programming Skills - Grade analysis
 - Memo 'Role of the Board of Examiners in grade analysis'