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B Advanced Technology
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Summary

Standard 1. Intended learning outcomes

The panel concludes that the bachelor's programme Advanced Technology (AT) has a clear and distinctive profile, providing students with relevant academic knowledge and skills within the domain of science and engineering. It appreciates the interdisciplinary focus of the programme and its orientation towards the work field. Students are adequately prepared for both advanced studies and professional careers in diverse fields. The conceptually strong ILOs of the programme match national and international requirements for bachelor's programmes and reflect the profile of the programme.

The panel appreciates the programme's responsiveness to societal and professional developments and encourages it to continue adapting the curriculum accordingly. It recommends making the attention to broader perspectives and societal impact more explicit in both the ILOs and the curriculum, which would further strengthen the focus on ethics of technology and critical thinking. The panel also suggests strengthening communication around the programme's profile, so that AT's vision and programme are more widely recognized.

Standard 2. Teaching-learning environment

The panel considers the curriculum to be well-structured, future-oriented, and aligned with the ILOs. It appreciates the programme's solid technical and scientific foundation, as well as its interdisciplinary and flexible structure, which allows students substantial freedom to tailor their studies. The panel also values the project-based, application-oriented educational approach, and the ongoing efforts to strengthen the mathematics component. The panel supports the curriculum redesign aimed at improving coherence and flexibility, although it could be communicated more clearly to students. The interdisciplinary projects help balance breadth and depth, broaden students' perspectives, and strengthen the connection between theory and practice. The programme actively supports students in exploring career paths. The panel recommends greater clarity in how societal impact and broader perspectives, such as the energy transition, are addressed across the curriculum, potentially through a formalized learning line. It also recommends making the academic skills learning line more explicit, with a stronger focus on ethics, and suggests further strengthening AI-related content.

According to the panel, the choice for an English name and language of instruction is well substantiated and in alignment with the international nature of the professional and academic field. The programme's international orientation is reflected in the international and active learning community.

The panel determines that students are well-supported throughout the programme and considers the programme to be feasible. AT demonstrates a strong commitment to student success through its extensive support system, including attention to the needs of students with impairments. Regarding elective choices at the end of the second year, the panel advises the programme to ensure clear expectation management and communication to prevent delays. Admission criteria, the information provided to students, and facilities for students are all satisfactory. The programme is advised to continue monitoring and supporting female student enrolment.

The teaching staff have the broad expertise and qualifications required for the programme, with strong and diverse scientific backgrounds covering its full academic scope. They are committed and responsive to students, who value their accessibility. In light of the ongoing curriculum revision and the extensive student guidance, the panel advises programme management to remain mindful of staff workload.

Standard 3. Student assessment

The panel concludes that the programme's assessment system is transparent and well-designed. Adequate procedures, such as clear rubrics, are in place to ensure assessment quality. Amongst others, the panel appreciates the diverse and appropriate assessment methods, as well as the balance between individual and group work. It also welcomes the standardized assessment process, including the detailed rubric used for bachelor's assignments. The Examination Board effectively safeguards the quality of assessments within the programme and takes a proactive approach in monitoring the bachelor's assignment process.

Standard 4. Achieved learning outcomes

The panel concludes that the level of the theses is appropriate for an academic bachelor's programme and that students achieve the intended learning outcomes. The programme effectively prepares students for a wide range of postgraduate studies and careers. Alumni are generally content with the programme and are well prepared to perform successfully in the academic and professional field in the Netherlands and abroad.

Score table

The panel assesses the programme as follows:

Bachelor's programme Advanced Technology

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,

Dr. Cees Terlouw, panel chair — Carlijn Braam MA, panel secretary

Date: 24 February 2026

Introduction

Procedure

Assessment

On 21 November 2025, the bachelor's programme Advanced Technology of the University of Twente 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 University of Twente. Peter Hildering acted as coordinator in the cluster assessment and Carlijn Braam acted as secretary for the assessment of the bachelor's programme Advanced Technology. They have 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 7 July 2025, the NVAO approved the composition of the panel. The coordinator instructed the panel chair on his role in the site visit according to the Panel chair profile (NVAO 2016).

Preparation

The programme composed a site visit schedule in consultation with the coordinator (see appendix 3). The programme selected representative partners 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 over the academic year 2024-2025. In consultation with the coordinator, the panel chair selected 15 theses of the programme., taking the diversity of final grades and examiners into account. Prior to the site visit, the programme provided the panel with the theses and the accompanying assessment forms. It also provided the panel with the documentation (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 and the theses, as well as the division of tasks and focus areas 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.

Site visit

During the site visit, the panel interviewed various programme representatives (see appendix 3). The panel also offered students and staff members an opportunity for confidential discussion during a consultation hour. No consultation was requested. The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the preliminary findings, general observations of the panel and suggestions for development themes.

Report

The secretary wrote a draft report based on the panel's findings and submitted it to the coordinator 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 University of Twente.

Panel

The panel assessing the bachelor's programme Advanced Technology of the University of Twente consisted of the following members:

- Dr. C. (Cees) Terlouw, researcher and consultant at Terlouw Advies & Onderzoek [panel chair];
- Prof. dr. A. (Aimee) Van Wynsberghe, Alexander von Humboldt professor for Applied Ethics of AI at the Universität Bonn (Germany);
- Prof. dr. ing. G. (Gerhard) Schmitz, emeritus professor at the Institute of Engineering Thermodynamics of the TU Hamburg (Germany);
- Prof. dr. ir. C.F. (Joost) de Winter, professor in Cognitive Human-Robot Interaction at Delft University of Technology;
- M. (Margot) Winters MSc., system engineer at Space Application Services, and recent alumna of the master's programme Aerospace Engineering at Delft University of Technology [student member].

Each panel member, the panel secretary and the programmes 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.

Information on the programme

Name of the institution:	University of Twente
Address:	Drienerlolaan 5, 7522NB Enschede
Website:	http://www.utwente.nl
BRIN-number:	21PH
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	B Advanced Technology
ISAT number:	50002
Orientation of the programme:	Academic
Level of the programme:	Bachelor (NLQF 6)
Number of credits:	180 EC
Language of instruction:	English
Professional requirements:	no
Location:	Enschede
Mode(s) of study:	Fulltime
Assessment group:	WO B Advanced Technology (Uniek)
Awarded degree:	BSc.
Submission date NVAO:	1 May 2026

Description of the assessment

Organization

The bachelor's programme Advanced Technology is embedded in the faculty of Science and Technology (S&T), one of the five faculties of the University of Twente (UT). The faculty board of S&T appoints the programme director and the members of the Examination Board (EB) and determines the Education and Examination Regulations (EER), which include the Programme Intended Learning Outcomes (PILOs, or ILOs). The programme director is responsible for the development and implementation of the curriculum as well as the quality assurance.

The programme director is responsible for the quality and content of the programme, while the programme coordinator is responsible for the administrative part of the programme. The Programme Committee advises on programme content, promotion and quality control. Responsible for carrying out quality assurance actions is the Quality Assurance Committee. The Examination Board for the programmes Advanced Technology (BSc) and Nanotechnology (MSc) is responsible for the quality of assessment, the appointment of examiners and the framework used for the assessment. The study association Astatine organizes activities for AT and Nanotechnology students. One of the board members is advisor to the programme committee.

Recommendations previous panel

The last formal external assessment of the bachelor's programme Advanced Technology of the University of Twente took place in December 2019. The panel at the time identified several points of attention and provided recommendations for further improvement. For the current assessment, the programme reflected on these points and described the actions undertaken in response to the recommendations of the previous panel. The previous panel recommended the programme to continue the careful monitoring of its international intake, and take measures to increase this if necessary to continue to realize its intercultural goals. Furthermore, the panel recommended making the development of students' programming skills more explicit by placing it within a separate learning trajectory; creating more subcategories in the thesis assessment form associated with the programme's ILOs; as well as standardizing the use of assessment forms in an administrative sense. In response to these recommendations, the programme has introduced an updated curriculum with a specific learning trajectory 'computational science'; monitors international student intake; has updated the thesis assessment form in line with thesis assessment in other technical BSc programmes at UT; and has standardized the administrative use of assessment forms. The panel concludes that the programme has addressed the previous recommendations with genuine commitment and is generally satisfied with the improvement measures taken.

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 bachelor's programme in Advanced Technology (AT) aims to educate engineers with a T-shaped profile, combining expert knowledge in a specific area with a broad range of engineering skills and problem-solving abilities. As a broad bachelor's programme within the domain of Science and Engineering, the AT

programme integrates engineering and natural sciences at the bachelor's level, along with essential mathematics and programming skills and an understanding of the impact of technology on society. In addition, the programme focuses on innovation and entrepreneurship, reflecting the university's entrepreneurial spirit. As graduates enter a complex and rapidly changing environment, the AT programme aims to equip students with a broad skill set, ensuring they develop profound technical expertise, strong interpersonal skills, and the ability to collaborate across disciplines, adapt to new knowledge, and apply it in broader societal and interdisciplinary contexts. The panel recognizes the distinctive profile of the programme, its interdisciplinary focus and its orientation on both academics and the professional field. It appreciates the broad approach, which prepares students for a wide variety of (inter)disciplinary master's programmes, particularly in engineering disciplines such as nanotechnology, mechatronics, and sustainable energy.

Intended learning outcomes
The panel is of the opinion that the vision and profile of the programme have been well translated into the intended learning outcomes (ILOs, see Appendix 1). The ILOs are aligned with the domain-specific frame of reference (DSFR) and the nationwide Beethoven programme (which focuses on enhancing the technology sector by fostering collaboration among educational institutions, industry, and government), and meet international academic and professional standards. The ILOs clearly separate knowledge areas (engineering, physics, etc.), skills (research, design, communication, teamwork), and attitudes (self-reflection, etc.). They reflect the programme's aim to educate T-shaped professionals and allow students to explore and develop their interests in science and engineering. The panel notes that, through the DSFR, the ILOs are based on the Meijers criteria – a framework for academic (design) education developed by the 4TU Federation, which includes the Dutch universities of Delft, Eindhoven, Wageningen, and Twente. These criteria are used as a replacement for the Dublin Descriptors, as they are considered more suitable for technical programmes. The panel considers the ILOs to be conceptually strong and appropriate for the academic bachelor's level; they match level 6 of the Dutch Qualification Framework (NLQF). The panel observed that an important competence in the Meijers criteria, and for Advanced Technology, is the ability to take temporal and societal context into account in research and design. This competence is currently missing from the programme's ILOs, and could be added to enhance the focus on this aspect.

The panel considers the programme to be responsive to developments in the professional and academic fields and aligned with contemporary societal debates, such as national initiatives to stimulate enrolment in technical fields. AT has sharpened its profile since 2020, with ILOs being revised where necessary. The panel commends the programme for effectively following up on previous recommendations and for updating the curriculum in response to societal developments such as the energy transition and advances in robotics. The panel encourages the programme to continue on this path, while making attention to broader perspectives and societal impact more explicit in the ILOs as well as the curriculum (see standard 2). In this way, the focus on critical thinking and ethics of technology in the programme could be enhanced.

Based on interviews with students and alumni, the panel also advises improving communication of the programme's profile, as its focus is not always clear to prospective students or to potential master's programmes. Students and alumni indicated that the programme name is not widely recognized and does not clearly convey its content. As a result, in some cases students need to explain the nature of the programme when applying for master's programmes. While some alumni reported no difficulties in gaining admission to a relevant master's programme, they nonetheless confirmed that the programme's profile and name are not immediately understood by external audiences.

Considerations

The panel concludes that the bachelor's programme Advanced Technology has a clear and distinctive profile, providing students with relevant academic knowledge and skills within the domain of science and engineering. It appreciates the interdisciplinary focus of the programme and its orientation towards the work field. Students are adequately prepared for both advanced studies and professional careers in diverse fields. The conceptually strong ILOs of the programme match national and international requirements for bachelor's programmes and reflect the profile of the programme.

The panel appreciates the programme's responsiveness to societal and professional developments and encourages it to continue adapting the curriculum accordingly. It recommends making the attention to broader perspectives and societal impact more explicit in both the ILOs and the curriculum, which would further strengthen the focus on ethics of technology and critical thinking. The panel also suggests strengthening communication around the programme's profile, so that AT's vision and programme are more widely recognized.

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

Curriculum

The curriculum of the full-time three-year bachelor's programme consists of a first year with mandatory courses, a second year with a mix of compulsory (flexible) courses and electives, and a third year with space for pre-master courses, electives and a thesis project (15 EC). The curriculum includes 61 EC of electives: 19 EC in the second year and 42 EC in the third year. An overview of the curriculum is presented in appendix 2. Due to its interdisciplinary character, courses are often shared with other science and engineering bachelor's programmes at the UT.

In the first year, students focus on foundational knowledge in science and engineering. The curriculum covers key areas such as mechanics, electronics, process engineering (thermodynamics), and materials science & nanoscience. This core knowledge is complemented by an introduction to modelling and the study of dynamical systems. Throughout the year, students strengthen their mathematical skills, develop experimental skills, and gain an initial understanding of research and design methodologies.

In the second year, students follow core courses in signals and systems, vector calculus and its application in electromagnetism, and numerical methods. In addition, they choose elective modules aligned with four main focus areas, reflecting the master's programmes chosen by most AT students: mechatronics and robotics, sustainability and process engineering, nanotechnology and materials science, and data science. This structure allows students to explore and prepare for future specialization, with flexibility to choose alternative modules if desired, such as the applied physics module.

In the third year, students deepen their knowledge and skills by choosing courses or minors that align with their intended master's programme or allow exploration of new specializations. With guidance from their

study advisor, each student designs a tailored curriculum that requires approval from the Examination Board, enabling students to shape their own study path. Preparation for this process begins at the end of the first year through the *Challenges in Science and Engineering* course and continues in the second year with information sessions and meetings with representatives of master's programmes. For commonly chosen master's programmes, a list of required courses is updated annually and published on the AT website. Pathways are available for admission to the 18 eligible master's programmes at the University of Twente.

Students also have the option to obtain a Dutch taught second-degree teaching qualification in Physics, Chemistry, Math, or Design Engineering by completing the educational minor *Leren Lesgeven* ('Learning how to teach'), which is noted on their diploma. They can further pursue a first-degree qualification through an educational master's programme. The module is organized by the Department of Teacher Development (ELAN) and overseen by the Examination Board of Interdisciplinary Sciences (BMS faculty), with its quality evaluated externally as part of the Science Education and Communication (SEC) master's accreditation process.

According to the documentation the panel received, distinctive features of the programme are its educational model (see under *Teaching methods*), the integration of skills throughout the curriculum, the interdisciplinary approach combining scientific knowledge from different fields, its career orientation and tailored third year, and its strong international community. The panel recognizes and appreciates these characteristics. During the interviews, students expressed their general satisfaction with the programme, appreciating its interdisciplinarity and flexibility.

Curriculum redesign
In 2023, the programme initiated a curriculum redesign to improve coherence, flexibility, and alignment with students' academic and professional goals, with a stronger focus on academic and professional personal development. The revised first-year curriculum, featuring thematic semesters, started in September 2025. Adjustments to the second year started in 2024, aimed at better balancing study load. The redesign emphasizes key interdisciplinary areas linked to master's programmes, better integration of learning lines, especially on academic skills and scientific computing, and a first year that better reflects the overall programme. The academic skills learning line covers aspects such as teamwork and critical thinking; according to the panel, as mentioned above, the latter aspect could be enhanced. Although most of the original content remains, some courses have been relocated or redesigned.

The new structure includes a fixed foundational first year with increased flexibility in later years and aligns where possible with UT's quartile system, where each semester is made up of 2 quartiles. A key change is the swap of quartiles 2 and 4, enabling two interdisciplinary, semester-wide projects. These include an energy transition project focused on technological innovation and sustainability in a practical context, and the *Challenges in Science and Engineering* course, which helps students orient themselves toward electives and future study paths. The programme representatives added that the revised programme aligns with the UT-wide, project-based educational model. The longer-term projects (18–20 weeks) allow students to explore topics in greater depth. The interdisciplinary energy transition project is still under development. At the time of the site visit, teachers from multiple domains were working toward a coherent project that will combine literature studies and lab experiments, integrating insights from physics, materials science, and engineering.

The panel notes that the redesign also responds to suggestions made by the previous accreditation panel, particularly regarding increased visibility of individual learning trajectories and greater attention to entrepreneurial skills. A student survey indicated positive responses to the curriculum redesign. Students confirmed to the panel that they view the new curriculum as more balanced and an overall improvement.

Furthermore, the programme committee has been involved in the redesign, and changes are evaluated annually.

Overall, the panel considers the curriculum to be well structured, future-oriented, and well aligned with the ILOs. It appreciates the programme's interdisciplinary and flexible structure, its learning line for academic skills, as well as its solid technical and scientific basis, which provides a strong foundation in engineering and the natural sciences. It also values the substantial freedom students have to tailor their programme to their interests, a flexibility that is highly appreciated by students. The panel notes that the programme actively supports students in exploring career paths and entrepreneurship. In addition, the panel appreciates the ongoing curriculum developments, which represent a gradual change that builds on the strengths and content of the existing curriculum while introducing several improvements. The semester-wide interdisciplinary projects help strike a better balance between breadth and depth; they broaden students' perspectives and strengthen the alignment between theory and practice. According to the panel, increasing laboratory and project time has improved the balance between theoretical instruction and practical experience, as well as between home learning and on-campus learning.

The panel finds that the programme could more explicitly demonstrate how technical knowledge is translated into broader applications. While projects and selected modules help students develop a wider societal perspective, the panel encourages the programme to strengthen this translation and recommends providing greater clarity on how themes such as societal impact and the energy transition are addressed across the curriculum, potentially through a formalized learning line. In addition, the panel recommends making the academic skills learning line more explicit and placing a stronger emphasis on ethics to ensure students are well-prepared for professional and societal responsibilities.

Students mentioned that the programme's attention to artificial intelligence (AI), including education on its use, could be enhanced. Although some attention is already given to this emerging area, also in the context of assessment, the panel advises further strengthening AI-related content to equip students with the skills to use AI responsibly and to maintain the programme's relevance in a rapidly evolving technological landscape.

Finally, the panel notes that the motivation for and current status of the curriculum revision have been repeatedly communicated to students, although they reported during the interviews that this information was not always clearly retained. It endorses the continued involvement of students and the programme committee in the revision process.

Language of instruction and communication
The AT programme is taught in English and uses an English-language name. This allows for an international classroom and aligns with industry demand for qualified engineers. The programme contributes to the national Chiptech programme, which aims to increase the number of engineering graduates. With declining numbers of Dutch students, international enrolment has become essential. Given the strong labour market demand for AT graduates and the widespread use of English in science and engineering, the panel considers the use of English appropriate, as it prepares students for further education and careers in international, English-speaking environments. Since its introduction in 2010, the English-taught programme has attracted a diverse student population, fostering an inclusive and international learning environment. The programme takes care to support students in adapting to English-language education. The panel, for instance, appreciates the attention given to academic writing in the curriculum, for example through offline English writing sessions.

Admission and matching activities
Admission to the programme is unrestricted for students who hold a Dutch vwo-diploma with a science profile (N&T profile). All other admission requests are handled by the UT admission office. Diplomas need to be equivalent to the Dutch vwo-diploma, with advanced levels in mathematics, physics, chemistry and English. The student intake fluctuates with an average of 70-80 students annually.

The panel appreciates the mandatory matching activities, which are an integral part of the admission process and are designed to ensure alignment between prospective students' expectations and the programme. The process includes a questionnaire on prior education, study skills, motivation, and grades, potentially followed by a meeting with a study advisor. Applicants participate in a mandatory matching event with assignments on key topics and opportunities to meet staff and students. Based on their participation, applicants receive non-binding matching advice (positive, neutral, or negative), accompanied by supportive feedback, which is discussed individually.

The interdisciplinary programme draws a diverse student population of Dutch and international students with a wide range of backgrounds. Student numbers have increased significantly in recent years, stabilizing last year. Programme management indicated that these numbers are manageable but aims to keep intake around 100-120 students. The panel noted a decline in the relative number of female students. The programme clarified that this number increased again last year and is partly influenced by the UT's marketing strategy.

The panel considers that the programme has clear and reasonable entry requirements that align with its goals, and maintains a steady influx of students. It advises continued attention to female student enrolment.

Teaching methods
The programme is designed according to the Twente Educational Model (TEM), which is based on thematic, modular project-led education. In line with the university-wide model, the revised AT programme follows a semester-based structure to strengthen multidisciplinarity. The UT's Vision on Learning and Teaching emphasizes learning-by-doing, inclusive communities and self-development. Within this framework, students are prepared for academic and professional roles in research, design, and organization.

To support students in their learning, the AT programme uses a variety of teaching methods. The first semester emphasizes guidance through tutorials and combined lecture-tutorial ('colstruction') sessions. Lab preparation and completion are now mandatory, guided sessions at the university. Students indicated to the panel that they appreciate this change. Academic skills workshops have been rescheduled to align more closely with project experiences. In the second semester, teaching shifts toward lectures, encouraging students to take greater responsibility for independent study. The semester project includes literature research and paper evaluation, supported by intensive feedback and substantial teaching involvement. In the second year, a wider variety of learning methods is introduced. These include problem-based learning and guided self-study. Group work is incorporated into several courses. Students reported mostly positive experiences with group work to the panel. The panel values the relevant and varied teaching methods, including the project-based and application-oriented educational approach characteristic of the UT, cooperative interdisciplinary projects and laboratory demonstrations.

Feasibility and guidance
The panel views the guidance provided to students during the programme positively, noting that it offers a strong, supportive learning community. This includes an introduction period, where students are guided by trained senior AT students. An increase in study counsellors has allowed for more personalized guidance:

three (part-time) study advisors support students with academic progress and master's programme selection. Students meet their assigned advisor early in the programme, with proactive follow-up and additional meetings at key stages, particularly in the first and second years. Further meetings can be arranged as needed via an online tool. Students are referred to additional support services when necessary.

The programme is supported by dedicated teaching assistants (TAs), who are master's students, most of whom are AT alumni. TAs help with project supervision, and provide regular small-group or individual tutoring. Additional support is also provided by the study association through wellbeing initiatives and organized study evenings for collaborative learning. Students reported feeling well supported throughout the programme, highlighting the accessibility of teachers, study advisors, and the programme director, and noting that they feel their feedback is taken into account. AT provides students with extensive information both before enrolment and throughout their studies. All relevant details about the programme are available in the study information guide.

In addition, the programme provides facilities and tailored support for students with impairments or exceptional circumstances through personalized study plans. These include accommodations such as extra exam time or a reduced study load and regular guidance from a study advisor. Based on the information provided, the panel finds that the programme adequately supports students with functional impairments or other special needs.

During the previous accreditation, the panel encouraged the programme to address high dropout rates. The current panel notes that significant steps have been taken to improve dropout rates as well as completion rates. Since the programme's start, the four-year completion rate has increased from 25% to around 70% and has remained stable since 2013. The introduction of additional first-year mathematics support in 2021 has had positive effects. The panel appreciates this support programme and acknowledges the ongoing efforts to strengthen the mathematics component of the programme.

The panel noted improvements in the distribution of study load, which the programme partly attributes to the Smarter Academic Year initiative. Whereas some quartiles previously had workload that was perceived by students as significantly higher than other quartiles, recent curriculum adjustments have spread the study load more evenly across semesters. Students view this change positively, particularly in newer modules. While the first year remains challenging, students indicated that the programme provides substantial support, including small-group tutoring and guidance for students at risk of dropping out. This support, together with the social aspects of group work, helps students stay engaged.

The panel observes a strong commitment to student success through the extensive support system. The active learning community on campus enables students with diverse backgrounds to perform optimally. Nevertheless, it advises the programme to be mindful of the assumption that all students are ready to make well-informed elective choices by the end of the second year, as some students indicated they needed more time to make these elective choices. In this regard, the panel calls for clearer expectation management and communication to prevent delays, with special attention from the study advisor.

Teaching staff

The programme ensures high teaching quality by relying primarily on research-active lecturers with PhDs from various faculties across the university. Teaching is delivered by a mix of tenured staff, including full, associate, and assistant professors, and is supported by PhD students, who carry a 10% teaching workload during their first three years. In line with the Twente Educational Model, teaching is collaborative and interdisciplinary within coherent semesters. During the interviews, the programme director indicated that

collaboration between programmes and the sharing of lecturers function well, describing this as 'synergy'. Staff development is supported through the University Teaching Qualification (UTQ) programme, regular performance reviews, and opportunities for senior teaching qualifications. Most teachers and examiners hold a UTQ, and some hold a Senior UTQ. Faculty also meet regularly to discuss programme developments.

In light of the ongoing reorganization of the Faculty of Science and Technology, which also affects AT, the panel discussed the reduction in teaching capacity with programme representatives. It was informed that the reorganization is currently in its implementation phase. There is a positive attitude within the programme team and sufficient staff capacity to deliver all courses. Programme management highlighted its active focus on staff wellbeing and the interests of students. Team members have stepped in to address staffing gaps: study advisors have taken on additional tasks to deliver the academic skills learning line, and some gaps have been filled by teachers from other programmes. Financial changes have shifted much of the project and lab guidance from TAs to PhD students. TAs now primarily assist in foundational courses, such as programming, and provide small-group or individual tutoring.

The panel has established that the committed staff possess the broad expertise and teaching qualifications required for this programme. Staff are highly qualified, with strong and diverse scientific backgrounds, and provide a strong link between teaching and research activities. The panel appreciates their dedication, accessibility, focus on continuous improvement, and openness to student feedback, as well as the strong leadership that has provided continuity for more than a decade. In view of the ongoing curriculum revision and the extensive student guidance, the panel advises programme management to remain mindful of staff workload and to prioritize tasks accordingly. It also advises the programme to take into account that leadership will change over time, as the current programme director, who has been in the role for more than ten years, will not remain indefinitely, and to put safeguards in place to maintain consistency and quality.

Programme-specific facilities

The programme uses a range of dedicated facilities. These include a shared homebase with the BSc programmes Applied Physics and Chemical Science & Engineering and the MSc programmes Applied Physics, Chemical Engineering, and Nanotechnology, surrounded by staff offices; project rooms with basic tools and equipment; a Techno Center for Education and Research (TCO) workshop for simple metal and plastic manufacturing; lab rooms for physics and chemistry experiments, equipped with a laser woodcutting machine and 3D printers for projects; and the DesignLab, outfitted for laser woodcutting, 3D printing, and electrical work. The panel is positive about the excellent facilities and their accessibility, particularly the Homebase, which is maintained by three study associations. According to NSE results, the facilities and the study association Astatine contribute positively to overall student satisfaction.

Considerations

The panel considers the curriculum to be well-structured, future-oriented, and aligned with the ILOs. It appreciates the programme's solid technical and scientific foundation, as well as its interdisciplinary and flexible structure, which allows students substantial freedom to tailor their studies. The panel also values the project-based, application-oriented educational approach, and the ongoing efforts to strengthen the mathematics component. The panel supports the curriculum redesign aimed at improving coherence and flexibility, although it could be communicated more clearly to students. The interdisciplinary projects help balance breadth and depth, broaden students' perspectives, and strengthen the connection between theory and practice. The programme actively supports students in exploring career paths. The panel recommends greater clarity in how societal impact and broader perspectives, such as the energy transition, are addressed across the curriculum, potentially through a formalized learning line. It also recommends making the

academic skills learning line more explicit, with a stronger focus on ethics, and suggests further strengthening AI-related content.

According to the panel, the choice for an English name and language of instruction is well substantiated and in alignment with the international nature of the professional and academic field. The programme's international orientation is reflected in the international and active learning community.

The panel determines that students are well-supported throughout the programme and considers the programme to be feasible. AT demonstrates a strong commitment to student success through its extensive support system, including attention to the needs of students with impairments. Regarding elective choices at the end of the second year, the panel advises the programme to ensure clear expectation management and communication to prevent delays. Admission criteria, the information provided to students, and facilities for students are all satisfactory. The programme is advised to continue monitoring and supporting female student enrolment.

The teaching staff have the broad expertise and qualifications required for the programme, with strong and diverse scientific backgrounds covering its full academic scope. They are committed and responsive to students, who value their accessibility. In light of the ongoing curriculum revision and the extensive student guidance, the panel advises programme management to remain mindful of staff workload.

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 University of Twente has established a central testing policy called the 'UT assessment policy framework'. This framework provides guidelines for staff on ensuring the quality and content of assessments and clarifies how assessment quality is monitored. The assessment policy is linked to the UT vision on teaching and learning. In line with this framework, the AT programme has developed its own assessment framework, which defines the tasks and responsibilities of programme staff, the Examination Board, and teachers. The panel notes that the programme-specific Education and Examination Regulations (EER) are aligned with the assessment policy, as are the regulations of the Examination Board.

For each semester, examination topics, assessment methods, scheduling, and examiners are outlined in an assessment plan. The plan defines 20-30 learning outcomes per semester, aligned with Bloom's taxonomy and linked to both programme learning outcomes and specific assessments. Course examiners develop the plan, which is advised on by the Examination Board, approved by the programme director, and published in OSIRIS and the digital learning environment Canvas for transparency.

The panel notes with satisfaction that a variety of assessment methods are employed, including written and oral exams, presentations, demonstrations, assignments, lab journals, and papers. The programme uses a mix of summative and formative assessments to support active learning and monitor student progress. Knowledge is typically assessed through individual (written) exams, while the assessment of projects

combines group reports with individual tests, such as individual reflection reports, presentations or peer feedback. The panel was informed that, due to the rise of generative AI tools, some courses have replaced unsupervised assignments with other forms of assessment, such as oral presentations. There is a UT-wide policy on the use of AI: teachers must indicate what is permitted for each course or assignment, and students are required to disclose their use of AI tools. The panel observes that the programme is considering how to address GenAI in education and assessment, but that this is still a work in progress.

The panel appreciates the balance between individual and group work in the programme, and notes that each ILO is evaluated at least twice with an individual assessment component. Projects typically involve groups of three or more students. Students reported that they are encouraged to communicate regularly with TAs and teachers, and that teachers are attentive to group dynamics. Project assessment includes presentations and reports graded by teachers, as well as observations by TAs. Some projects also incorporate peer assessment at intermediate stages, with group members occasionally grading each other. Based on the documentation and interviews, the panel concludes that AT has a clear assessment system, in accordance with the UT vision and assessment policy, and linked with the ILO's.

Graduation project
Before starting the bachelor's assignment, students complete the mandatory Preparation Bachelor's Assignment (PBA) course. In this course, they select and formulate their assignment, including its international context, relevance, main research question, and planned activities. The administrative process is managed through a set of forms available on the AT website. The course concludes with an individual report and presentation and is assessed on a pass/fail basis, providing early feedback on organizational, reporting, and presentation skills. The panel appreciates that the programme supports students in this way.

The bachelor's assignment is typically conducted within one of the university's research groups, under the supervision of a daily supervisor (usually a PhD student) and a full or associate professor. Students are provided with a list of professors and are expected to actively seek supervision. The project is guided and assessed by a BSc assignment committee consisting of at least three appointed members: a chair, the daily supervisor, and an external member. Students informed the panel that they are in regular contact with their supervisor, including a standard midterm session, and that supervisors provide feedback prior to thesis submission.

Each bachelor's assignment must be approved by the Examination Board with respect to scientific level, feasibility, scope, and supervision. Assessment of the bachelor's assignment is based on a standardized assessment form with a detailed rubric, in which three partial grades are combined into a final grade. The rubric clearly specifies expectations for each grade level, ensuring uniform and transparent assessment. The panel was informed that the assessment committee evaluates the thesis, a presentation and discussion, and related lab work, and records written feedback on the assessment form. This is followed by an oral feedback session to reflect on the assessment.

The panel reviewed a selection of 15 theses, including the corresponding assessment forms. It generally agrees with the grades awarded to the theses and found the feedback adequate, although it noted an incidental discrepancy that was discussed in the meeting with the teachers and the Examination Board.

Examination Board
The AT Examination Board is responsible for the quality of assessment in the programme and regularly evaluates all courses, including electives. The chair and secretary of the Examination Board meet regularly with other Examination Boards at the faculty level to share best practices. At the university level, there is an

Assembly of Examination Board Chairs, supported by colleagues with legal expertise. The panel notes that the Examination Board is also in close contact with the programme director.

In the third year, students create a personalized curriculum by choosing courses or minors that match their interests. The panel discussed the process for selecting electives with the Examination Board, which explained that it follows a standard procedure for approval: reviewing the course list to ensure students can graduate and checking eligibility for intended master's programmes. The panel is assured that this procedure effectively safeguards students' ability to graduate.

Examiners and members of the BSc assignment committee are appointed by the Examination Board and adhere to the *Quality Guidelines for Assessment*. The external member of the committee is selected to ensure affiliation with the programme and to safeguard a fair assessment process. The panel learnt that the external member is often a member of the Examination Board from a different research group. This member specifically checks whether the assessment form has been properly completed.

In line with the assessment protocol, the Examination Board regularly reviews the assessment process of the bachelor's assignment – particularly the use of the assessment form and assignments graded 6, 9, or 10 – to ensure consistency, fairness, and proper justification. To evaluate the quality of the assessment of bachelor's assignments, once every six years a thesis carousel is organized. A representative selection of recent assignments is re-assessed by two examiners per thesis to monitor consistency and quality. The Examination Board discusses the results and updates assessment procedures and guidelines where necessary. Their recent review of bachelor's assignments concluded that BSc committees generally provide sufficient justification for grades; in one case, a committee was asked to re-evaluate the assessment. The assessment form is similar to those used in other BSc programmes, supporting a uniform assessment process.

Based on the documentation and the interviews during the site visit, the panel concludes that the Board of Examiners is critical and reflective, and adequately safeguards the quality of assessment in the programme. The panel particularly appreciates the thesis carousel system, which ensures a consistent review of the assessment of bachelor's assignments and is reported on by the Examination Board.

Considerations

The panel concludes that the programme's assessment system is transparent and well-designed. Adequate procedures, such as clear rubrics, are in place to ensure assessment quality. Amongst others, the panel appreciates the diverse and appropriate assessment methods, as well as the balance between individual and group work. It also welcomes the standardized assessment process, including the detailed rubric used for bachelor's assignments. The Examination Board effectively safeguards the quality of assessments within the programme and takes a proactive approach in monitoring the bachelor's assignment process.

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

Theses

The 15 EC bachelor's thesis, known as the bachelor's assignment, is regarded as the programme's final work, in which students individually demonstrate achievement of the ILOs and their knowledge and skills as T-shaped professionals. Students carry out an individual research or design project and complete it by writing a report and presenting and defending their findings. In preparation for the site visit, the panel examined 15 theses. In the selection, a proper distribution across grades was ensured, as well as coverage of all faculties involved in AT. In the opinion of the panel, the level of the examined theses is appropriate for an academic bachelor's programme. It was impressed with the high scientific level of several theses. In general, the theses demonstrate the achievement of the ILOs and are of expected quality. The wide range of topics reflects the broad nature of the programme.

Alumni

The AT programme's main goal is to provide students with a general science and engineering background that allows them to enrol in a master's programme of their choice. A recent alumni survey (2025) shows that AT is valued for its strong, broad engineering foundation and effective balance between theory and hands-on experience. Alumni reported feeling well prepared for a wide range of master's programmes, such as Mechanical Engineering and Robotics, the latter being a particularly popular choice, as well as for their future careers, citing strong analytical, problem-solving, and transferable skills. The programme's flexibility, interdisciplinary scope, and emphasis on both technical and soft skills were identified as key strengths, contributing to successful master's and PhD trajectories and diverse career paths.

Alumni corroborated these positive outcomes to the panel, indicating that they feel well equipped to apply their skills and knowledge effectively. The panel determines that students are adequately prepared to secure suitable employment or pursue further education, and that the programme's broad profile makes graduates flexible in their employability. Additionally, the panel appreciates the extensive involvement of students and alumni in the development of the programme. It suggests that annual presentations by alumni, showcasing their current careers and activities, could help students gain a better understanding of potential paths after completing the bachelor's degree.

Considerations

The panel concludes that the level of the theses is appropriate for an academic bachelor's programme and that students achieve the intended learning outcomes. The programme effectively prepares students for a wide range of postgraduate studies and careers. Alumni are generally content with the programme and are well prepared to perform successfully in the academic and professional field in the Netherlands and abroad.

Conclusion

The panel concludes that the programme meets standard 4.

General conclusion

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

Recommendations

1. Make the attention to societal impact and broader perspectives, such as the theme of energy transition, in the programme more explicit in both the ILOs and the curriculum.
2. Further strengthen the focus on ethics of technology and critical thinking within the academic skills learning line.

Appendix 1. Intended learning outcomes

The Advanced Technology graduate:

1. Can apply basic theoretical concepts, important methods and techniques in the fields listed below and has skills to increase and develop this through study:
    a. Elements from mechanical engineering, electrical engineering, physics, chemistry: Newtonian dynamics, Thermodynamics, Material Science, Mechatronic systems, Electromagnetism, System Engineering
    b. Mathematics and programming
    c. Innovation, business administration and development/trends of technology on a local and a global level
    d. Experimentation in the technical sciences
2. Can apply scientific research methods.
3. Can apply scientific design methods and is able to divide a design problem in different sub-problems.
4. Can organize work both independently and as a member of a culturally diverse project group. In project work: Is able to
    a. define separate problems for team members,
    b. assure the interconnection between these problems,
    c. implement a timeline.
5. Is capable of communicating on technical-scientific issues both in writing and orally in a clear, concise and professional manner.
6. Is capable of analysing, modelling, interpreting and solving technical-scientific problems with an academic approach, i.e., formulating a problem definition, selecting scientific information and processing it, conducting research and critically evaluating the subsequent results, and of formulating conclusion.
7. Is able to recognize personal strengths and weaknesses as well as personal interests that are necessary to opt for either a follow-up study (in particular an academic master's programme which requires a high level of autonomy) or a job in the labour market.

Appendix 2. Programme curriculum

Semester 1: Mechatronics

Q1	EC	Q2	EC
Calculus 1	4	Calculus 2	4
Mechanics	4	Basic Electronics	4
Experimentation	3	Accelerometer	4
System Dynamics 1 (starts late in Q1)			3
EAPS (semester)			3

Semester 2: Sustainability: Materials and Energy

Q3	EC	Q4	EC
Structure and Properties of Materials	3	Linear Algebra	3
Quantum Matter and Devices	4	Thermodynamics	4
Organic Chemistry	3	System Dynamics 2 (incl. labs)	4
Lab 2	1		
Project Energy Transition			6
Challenges in Science and Engineering			2

Semester 3: Signal Analysis

Q1	EC	Q2	EC
System Dynamics 3	4	Elective courses	15
Signal Processing	4		
Project	3		
Elective	4		

Semester 4: System Design and Validation

Q3	EC	Q4	EC
Vector Calculus	2		
EM Statics	5	EM Dynamics	3
Data Statistics and Probability	6	Project	4
Innovation and Entrepreneurship			6
Numerical Simulation of Physical Systems			4

Semester 5: Master preparation

Q1	EC	Q2	EC
Electives			30

Semester 4: Professional Finalization

Q3	EC	Q4	EC
Preparation BSc Assignment	3	BSc Assignment	15
Electives	12		

Appendix 3. Programme of the site visit

21 November 2025

09.00 - 09.15	Arrival and welcome
09.15 - 09.45	**Interview programme management**
10.00 -10.45	**Interview students and alumni**
11.00 – 11.45	**Interview teaching staff**
12.00 – 12.30	**Thematic session 1**
12.30 – 13.15	Lunch break
13.15 – 13.45	**Tour of the facilities**
14.00 – 14.30	**Thematic session 2**
14.45 – 15.15	**Interview Board of Examiners**
15.15 – 16.00	Internal panel consultation
16.00 – 16.30	**Concluding interview management**
16.30 – 17.00	Internal panel consultation
17.00 – 17.30	**Oral feedback**

Appendix 4. Materials

Prior to the site visit, the panel studied 15 theses of the bachelor's programme Advanced Technology. Information on the theses is available from Academion upon request.

The panel also studied other materials, which included:

- SWOT Analysis
- Student Chapter
- Report previous accreditation
- Website for prospective and current students
- Programme Intended Learning Outcomes
- Domain-Specific Framework of Reference
- Old and new curriculum overview
- Documents on guidance and study advice
- UT language policy
- Teaching methods overview
- Teaching staff and examiners
- Grading forms final projects
- Assessment policies
- Assessment plan
- Education and Examination Regulations (EER)
- Annual reports Exam Board
- BSc thesis assessment protocol and form

Additional information

- Project materials for applications Bachelor CSE + AT (Project manual version, 2025)
- Annual report Examination Board AT 2021-2022, 2023-2024
- Minutes Examination Board
- Report of thesis carousel Examination Board AT
- BEX AT Overview of test screenings
- Evaluation form for quality of assessment AT
- Analysis of assessment plan, 2023
- Information on Master Orientation, admission requirements