Computer Science and Engineering
Eindhoven University of Technology

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Project code P2409

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Summary

Standard 1. Intended learning outcomes

The panel appreciates the structured and well-considered set of intended learning outcomes for the BCS programme, which are clearly articulated and effectively reflect industry standards and the required bachelor's level. The intended learning outcomes of the CSE programme are valued for showing a well-balanced integration of research focus and engineering practice, for including data-centric competencies, and for showing the appropriate master's level. It pleases the panel to see that both programmes work on updating their intended learning outcomes. The panel recommends both programmes reinstalling an external advisory board for the computer science domain, and suggests using the board, among others, to reflect on their intended learning outcomes.

Standard 2. Teaching-learning environment

The panel values the coherent and well-structured curriculum of the BCS programme, which is organized along clearly defined learning lines, effectively aligns with its intended learning outcomes, and balances theoretical knowledge and applications. The curriculum of the CSE programme is appreciated by the panel for being appropriate and well-designed, and for offering valuable opportunities for students to specialize in one of the three focus areas. The panel recommends the CSE programme (regular) to develop clearer study paths, while the IST track is encouraged to expand its course offerings.

The panel looks positive at the stimulating and supportive learning environment of the programmes, which effectively motivates students and fosters the achievement of intended learning outcomes. The international and inspiring atmosphere is enhanced by diverse teaching methods and strong connections to professional practice. The SCOP/e programme, together with personal supervision and mentoring are strong: they help students develop professional skills, support them in making informed decisions about their personal study and career paths, and contribute to overall student wellbeing. In both programmes, the comprehensive information and communication platforms facilitate access to course content, communication, timely feedback, and assessment, and create a truly student-centered experience. The panel recommends implementing temporary and medium-term measures to optimise the use of existing spaces.

The panel values the teaching staff for being highly experienced and knowledgeable in core areas of computer science and related fields, and for being committed to continuous professional development. The strong ties of teaching staff to both research and industry help in delivering curricula that remain current and practically relevant. It is a nice compliment that students consistently appreciate the timely, constructive feedback of teaching staff, their approachability, and their openness to incorporating student input. It pleases the panel to see that staff is provided with structural opportunities for pedagogical training and innovation. The panel recommends the continuation of allowing sufficient time for teaching staff to engage in education innovation and professional development activities, and the proactive management of staff workload. Special attention should be paid to the extra effort required for supervising and assessing the individual Bachelor Final Project.

Standard 3. Student assessment

The panel compliments the programmes with having an elaborate, valid, reliable, and transparent system of assessment that includes diverse and balanced assessment methods, and a multi-assessor approach for final projects. The programmes provide students with a nice blend of theory and practical work, and individual and group assessment. For the BCS programme, the panel recommends strengthening central support for intermediate summative assessments by investing in adequate facilities, technical support, and logistical

arrangements. For the CSE programme, the panel recommends considering the inclusion of clearly defined pass/fail thresholds and comprehensive guidelines for thesis grade substantiation.

The panel values the central role of the examination committee in maintaining the academic quality and fairness of the assessment. The active stance of the programmes towards generative Artificial Intelligence pleases the panel: actions taken are appropriate, timely, and aligned with best practices.

Standard 4. Achieved learning outcomes

The panel appreciates the technical and analytical quality of the SEPs and the master theses, which reflect the practical and academic excellence fostered within the programmes. The programmes can be proud of delivering graduates that find relevant employment quickly and are highly regarded by employers. The quality of final projects and the performance of graduates demonstrate that students of both programmes achieve the intended learning outcomes.

Score table

The panel assesses the programmes as follows:

B Technische Informatica

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

M Computer Science and 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. ir. Bart Preneel	Dr. Rik Ligthart
Chair	Secretary

Date: 25 February 2026

Introduction

Procedure

Assessment

Between 3 and 5 November 2025, the bachelor's and master's programmes Computer Science and Engineering of the Eindhoven University of Technology were assessed by an independent peer review panel as part of the cluster assessment. The assessment cluster consisted of 25 programmes, offered by the institutions Open Universiteit, Leiden University, University of Groningen, Utrecht University, Radboud University, Eindhoven University of Technology, Delft University of Technology, Vrije Universiteit Amsterdam, University of Amsterdam, and University of Twente. 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 the Computer Science cluster. Peter Hildering acted as coordinator in the cluster assessment and Rik Ligthart acted as secretary for the assessment of the programmes of Eindhoven University of 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. In order to strengthen the mutual consistency between the assessment panels within the cluster, the coordinator from Academion ensured joint instruction for the panel members and a comparable assessment method for all site visits. This consistency was also a point of attention at all concluding panel meetings during the site visits. Finally, overlap in assessment panels of the various site visits in the cluster further strengthened the consistency. The composition of the panels was designed in such a way that at least two panel members also participated in another assessment panel in the cluster. On 30 April 2025 the NVAO approved the composition of the panel. The coordinator instructed the panel chairs on their role in the site visit according to the Panel chair profile (NVAO 2016) on 9 December 2024.

Preparation

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

The programmes provided the coordinator with a list of graduates over the period 2023-2024. In consultation with the coordinator, the panel chair selected four group projects amounting to 38 individual students of the bachelor's programme and 15 theses from the master's programme. The master's selection included 8 theses from the regular CSE programme, 3 from the special master's track Information Security Technology, and 4 from the recently discontinued track Data Science in Engineering (DSiE). This selection reflected the number of graduates in each particular specialization proportionally. Prior to the site visit, the programmes provided the panel with the theses and the accompanying assessment forms. They also provided the panel with the information files 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 information file and the theses, as well as the division of tasks during the site visit. The panel was also informed on the assessment frameworks, the working method and the planning of the site visits and reports.

Site visit

The site visit was combined with that of the master's programme Data Science & Artificial Intelligence (DS&AI), which was scheduled as a stand-alone accreditation. 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 publicly presented the preliminary findings.

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 programmes 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 Eindhoven University of Technology.

Panel

The panel assessing the B Technische Informatica and the M Computer Science and Engineering consisted of the following members:

- Prof. dr. ir. B. (Bart) Preneel, Full Professor Computer Security and Industrial Cryptography at the Faculty of Engineering at the KU Leuven [chair];
- Prof. dr. M. (Marco) Aiello, Professor of Service Computing at the University of Stuttgart;
- Prof. dr. habil. G. (Gergana) Vladova, Professor Computer Science Education/Computer Science and Society at the Humboldt Universität zu Berlin;
- Prof. dr. ir. W.P. (Willem-Paul) Brinkman, Professor Digital Behavior Change at the Faculty of Electrical Engineering, Mathematics and Computing Science at the TU Delft;
- I. (Imane) el Caïdi BSc, master student Computer Science (track Algorithmic Design and Analysis & Operations Research) at the Universiteit Utrecht [student member].

Information on the programmes

Name of the institution:	Eindhoven University of Technology (TU/e)
Address:	Groene Loper 3, 5612 AE Eindhoven
Website:	www.tue.nl
BRIN-number:	21PG
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive

Programme name:	Technische Informatica
ISAT number:	56964
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:	Eindhoven
Mode(s) of study:	Fulltime
Assessment group:	Computer Science
Awarded degree:	BSc
Educational minor:	Applicable
Submission date NVAO:	1 May 2026

Programme name:	Computer Science and Engineering
ISAT number:	60438
Orientation of the programme:	Academic
Level of the programme:	Master (NLQF 7)
Number of credits:	120 EC
Language of instruction:	English
Professional requirements:	No
Specializations or tracks:	Computer Science and Engineering Information Security Technology
Location:	Eindhoven
Mode(s) of study:	Fulltime
Assessment group:	Computer Science
Awarded degree:	MSc
Submission date NVAO:	1 May 2026

Description of the assessment

Organization

Eindhoven University of Technology (TU/e) is a publicly funded technical university located in Eindhoven. Its mission is to educate responsible engineers of the future who are prepared to take on significant societal, technical, and scientific challenges. TU/e aims to provide high-quality education that is authentic, flexible, and adaptable to the fast-changing world, and to deliver professionals who combine disciplinary knowledge with academic thinking and the ability to work and communicate in diverse, multidisciplinary environments. The university organizes its education into two main bodies: the Bachelor College, which manages all bachelor education, and the Graduate School, which accommodates all master's and (professional) doctorate programmes since 2015.

The bachelor Technische Informatica (referred to in this report as bachelor Computer Science and Engineering, BCS) is part of the Bachelor College, while the master Computer Science and Engineering (CSE) is part of the Graduate School. The BCS programme educates students to become responsible academic engineers with a fundamental understanding of computer science, while the CSE programme provides a broad and research-oriented education covering foundational and specialized areas of computer science. Both programmes are offered by the Department of Mathematics and Computer Science (M&CS), which organizes education in three domains: Mathematics, Computer Science, and Data Science. The BCS and CSE programmes fall under the Computer Science domain. Each domain has dedicated programme directors and managers responsible for practical and academic leadership.

Recommendations previous panel

The previous accreditation panel provided several suggestions for improvement. Suggestions made to the BCS programme included, among others, improving the visibility of academic skills in the curriculum, and monitoring that all students verifiably achieve every learning goal of the final project. Regarding the CSE programme, the panel advised, among others, to harmonize the formulation of domain-specific learning outcomes across respective tracks, and to address growth and educational innovation challenges properly. The panel finds that these advices have been considered carefully, leading to further improvement of the programmes. See, for further discussion, the respective sections in the report on these and other topics.

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

Intended learning outcomes: B Computer Science and Engineering

The mission of the bachelor's programme centers on delivering graduates who possess a robust theoretical foundation and practical skills in the field of computer science. The programme emphasizes a balance between thorough disciplinary knowledge and the development of professional and personal skills. Students are prepared for advanced studies and employment in the software industry with an academic engineer's attitude, by focusing on fundamental questions about computability, software modeling, and system design. The programme educates for professions such as software engineer, system designer, and algorithm developer.

The intended learning outcomes (ILOs) of the programme consist of a generic set of Bachelor College ILOs (which are shared among all TU/e bachelor's programmes), complemented with discipline-specific ILOs. The generic ILOs relate, among others, to being capable of supervised research and design, and being aware of interdisciplinary significance. The discipline-specific ILOs refer to competencies such as obtaining foundational knowledge in computer science, and developing expertise in solving introductory-level problems in computer science related to algorithms, theory, software development, and systems. They further include professional and personal development skills such as communication, collaboration, and ethical and societal awareness in multidisciplinary environments. The ILOs are aligned with the Computer Science Curricula 2023, an international standard for computer science programmes developed by the ACM (Association for Computing Machinery), IEEE Computer Society (Institute of Electrical and Electronics Engineers), and AAAI (American Association for the Advancement of Artificial Intelligence).

Based on the documentation and discussions during the site visit, the panel finds that the programme has a solid research focus coupled with appropriate attention for the professional practice. The set of ILOs are structured and well-thought-out. They are clearly formulated in terms of general bachelor outcomes and specific computer science outcomes. This setup ensures that the ILOs align with the criteria for academic bachelors and that they are grounded within the computer science domain. The ILOs are aligned with international frameworks, and demonstrably aligned with the Dublin descriptors at NLQF level 6, reflecting industrial standards and the required bachelor level. The attention in the ILOs to skills such as research methodology and scientific writing underlines the academic orientation of the programme.

The panel finds that the bachelor's programme has properly addressed the previous panel's recommendation to explicitly address the scientific dimension of academic skills in the learning outcomes. The scientific dimension is visible in both the general (e.g., graduates are able to conduct research and design) and specific learning outcomes (e.g., graduates can communicate clearly and effectively, both within the scientific and professional community). The panel believes the ILOs would benefit from explicit coverage of security, privacy, and AI topics as they are of growing importance in the computer science domain. Therefore, the panel suggests to incorporate into the ILOs topics of security, privacy, and Artificial Intelligence.

Intended learning outcomes: M Computer Science and Engineering
The mission of the master is to provide a research-oriented education that prepares students with a broad and deep understanding of computer science and engineering, enabling them to conduct research and work in multidisciplinary contexts. The programme emphasizes a balance between research and engineering practice in order to prepare students for diverse career paths in academia and industry. It covers advanced computer science topics across several research clusters in the Computer Science and Data Science domains. Students gain foundational knowledge in three focus areas (Algorithms & Theory, Architecture & Systems, and Software & Analytics) and deepen expertise in one of these areas. They are prepared for jobs such as software engineer, systems architect, security specialist, and data analyst. The master is closely connected to M&CS research clusters to enrich the programme with current research expertise and applications. Research clusters that contribute to the master include Algorithms, Formal Methods, Interconnected Resource-aware Intelligent Systems, Security, and Software Engineering & Technology. These clusters provide specific expertise that shapes the programme's focus and content, letting students gain knowledge and skills aligned with cutting-edge research.

The master offers a special track in Information Security Technology (IST), which specifically aims to train specialists in digital security by covering relevant knowledge areas in cybersecurity. Originally offered in collaboration with Radboud University and the University of Twente, IST has evolved into a full-fledged

specialization within TU/e since the academic year 2021-2022. Remarks in this report on 'CSE' or the 'CSE programme' refer to the regular programme as well as the IST track, unless specifically stated otherwise.

The intended learning outcomes of the master's programme (regular) contain discipline-specific outcomes in addition to TU/e-wide Graduate School learning outcomes. The general ILOs are based on the criteria for Academic Master's Curricula, which originate from TU/e and are also adopted by the University of Twente and Delft University of Technology. The discipline-specific ILOs cover the knowledge areas from the ACM-IEEE curricula as well as the ACM Computing Classification System. Together, the ILOs reflect a broad and flexible profile covering research, engineering practice, and personal and professional competencies. Students are trained, among others, to conduct independent research, to communicate internationally, and to consider societal and ethical contexts. The IST track has a specialized set of ILOs targeting cybersecurity. An alignment worksheet shows how the CSE ILOs and those of the IST track are aligned.

Based on the documentation and discussions during the site visit, the panel finds that the intended learning outcomes for the master demonstrate a well-balanced integration of research focus and engineering practice. The inclusion of data-centric competencies shows responsiveness to emerging trends. The ILOs are aligned with industry frameworks to incorporate recent developments in the field, and with the Dublin descriptors to reflect the appropriate master level. The ILOs of the IST track are distinct yet complementary within the broader master's offering. The panel finds that the discipline-specific ILOs are a bit generic, and could be linked stronger to the computer science domain.

The previous panel advised the CSE programme to harmonize the formulation of domain-specific learning outcomes. The programme has responded by developing two broad domain-specific ILOs, proposed by the programme's curriculum committee, and approved by the Programme Committee and programme management. The panel agrees that the programme has properly addressed this recommendation. At the same time, the panel feels that the broadness of the domain-specific ILOs has led to less focus and clarity in the master's profile (with the exception of the IST track). This is also experienced by the students, who feel that the broadness results in a less cohesive study programme. The panel understands that the programme is planning to address this issue by expanding the discipline-specific ILOs and by developing clearer study paths. The panel supports these efforts and suggests to increase focus on interdisciplinary and ethical aspects in the ILOs along the way.

Role of the professional field

The panel finds that both the BCS and CSE programme recognize the importance of aligning their ILOs with the evolving professional field and take action to ensure this alignment. Currently, the link to the professional field is structured via academic staff with hybrid appointments, research projects and project supervision. Both programmes are considering to reinstate an external advisory board for the Computer Science domain (which was dismantled in 2023) to directly discuss the ILOs with the professional field. The panel strongly supports this plan, and advises to use this board to reflect on the proposed update of the intended learning outcomes of both programmes.

Considerations

The panel appreciates the structured and well-considered set of intended learning outcomes for the BCS programme, which are clearly articulated and effectively reflect industry standards and the required bachelor's level. The intended learning outcomes of the CSE programme are valued for showing a well-balanced integration of research focus and engineering practice, for including data-centric competencies, and for showing the appropriate master's level. It pleases the panel to see that both programmes work on updating their intended learning outcomes. The panel recommends both programmes reinstalling an

external advisory board for the computer science domain, and suggests using the board, among others, to reflect on their intended learning outcomes.

Conclusion

The panel concludes that the bachelor's and master's programme meet 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: B Computer Science and Engineering

The three-year curriculum of the bachelor programme (see appendix 2, also for the curriculum of the master) consists of 180 EC and incorporates six learning lines: Foundations, Algorithms & Theory of Computing, Software Development, Systems, Professional & Personal Development (P&PD), and Challenge-Based Learning (CBL). The latter two are part of university-wide guidelines (Bachelor College 2.0) and are included to help students develop not only technical knowledge but also essential soft skills and problem-solving abilities. The SCOP/e kick-off for all 1st year students addresses the emergence of AI, and the programme is considering the introduction of an elective addressing AI literacy. Flexibility is a key aspect of the curriculum, as students are allowed to deepen their expertise or broaden their knowledge through electives, which may be grouped into focus packages such as security or robotics.

In the first year, the curriculum focuses on establishing a solid foundation in computer science principles and programming skills. Students engage in core courses that cover essential topics in computing and mathematics. The Challenge-Based Learning concept is introduced early, notably through the Autonomous Systems Twinning course, which immerses students in project-based learning environments that simulate real-world challenges. Additionally, students begin developing their professional and personal skills through the P&PD learning line, which is integrated throughout the programme. The second year builds on this foundation by deepening students' understanding across the core areas of computer science. It offers courses in algorithms, theory, software development, and systems, while continuing to reinforce professional skills and the CBL methodology. A multi-disciplinary CBL course promotes collaboration across different domains and encourages students to apply their knowledge to complex problems, in teams. The programme provides considerable elective space starting from the second year, allowing students to tailor their studies according to their interests and career goals. This flexibility supports both specialization within computer science and exploration of interdisciplinary topics. For bachelor's students that are interested in a teaching profession, it is possible to be educated as a so called "tweede graads" (second grade) teacher in either physics, mathematics or computer science. Students are offered the possibility to follow a "Statutory teacher-training minor" (educational minor) as part of their electives.

In the third and final year, students undertake more advanced and integrative work. This includes capstone courses within the learning lines and the Software Engineering Project (SEP), a team-based project where groups of about ten students design and develop a software product for an external or internal customer. This project simulates a professional software development process, and emphasizes collaboration, project management, and quality assurance. The Bachelor Final Project (BEP), introduced in the revised curriculum and starting in 2025-2026, will replace the SEP as the graduation work of students (the SEP is moved to the

beginning of year 3). The BEP is an individual, research-oriented endeavor that emphasizes academic writing and research methodology. The BEP spans two quarters and is designed to demonstrate students' ability to conduct independent scientific work. Throughout the third year, the curriculum integrates CBL in various courses and continues to support professional and personal development.

Based on the documentation and conversations during the site visit, the panel finds that the curriculum is well aligned with the intended learning outcomes of the programme. It is coherent, well-structured and organized along clearly defined learning lines. Students are offered a solid scientific foundation combined with engineering design, and are guided progressively from core computing and mathematics to more advanced subjects, culminating in the BEP. The implementation of the individual BEP strengthens the development of students' academic skills, while the SEP provides a strong link to professional practice. The curriculum effectively integrates challenge-based learning and professional and personal development, reflecting the TU/e Bachelor College 2.0 vision. Substantial elective space and the possibility of following an honours track allow students to tailor their learning experience to their interests. The panel sees that the programme actively addresses current trends, for instance by including AI literacy in the SCOP/e kick-off. Moving forward, the panel suggests to build on this by increasing the attention in the curriculum for AI in software development processes.

During the previous site visit, it was recommended to cover academic skills in the curriculum more explicitly. The programme responded to this recommendation by introducing the individual BEP, which explicitly addresses academic writing and research methodology. Also, the curriculum now contains academic writing assignments in multiple courses. The panel thinks that the programme has properly addressed this recommendation.

Curriculum: M Computer Science and Engineering
The two-year curriculum (regular) encompasses 120 EC and is organized around three focus areas: Algorithms and Theory, Architecture and Systems, and Software and Analytics. The curriculum presents a good balance between research and engineering practice and follows the Graduate School standard. Students take one foundational course from each focus area and deepen their knowledge in one chosen area through additional courses. The remainder of the curriculum is dedicated to CSE-specific and free electives, a seminar, and the preparation and execution of the Graduation Project. The flexible structure allows students to tailor their education while still covering the core competencies. The IST track has a different set-up and provides a more structured pathway. It contains five mandatory courses, three IST-specific electives, free electives (which can also include an internship or international experience), and an IST-specific seminar. IST-students also conclude the programme with a Graduation Project. The programme is planning to enhance the integration of ethical and societal aspects throughout the (CSE and IST) curriculum.

Based on the documentation and discussions during the site visit, the panel finds the curriculum of the CSE programme (regular) to be appropriate and well-designed. The provision for students to specialize in one of three focus areas is a valuable opportunity that supports tailored academic development. Students express high appreciation for the flexibility of the programme, which they identify as one of its strongest assets, as it enables them to shape their studies according to individual interests and goals. Seminar offerings are particularly commendable for preparing students for future academic or research-oriented career paths. The optional internship component is suitable as it provides practical preparation aligned with professional expectations. The panel sees that while the flexibility of the programme is valued, students sometimes face challenges in creating a well-structured curriculum. Predefined learning paths could help students to navigate the programme more effectively and to increase clarity regarding course choices, ultimately

improving feasibility and student satisfaction. Therefore, the panel suggests to provide students with predefined learning paths to simplify the process of curriculum selection and study planning.

For the IST track, the panel sees a structured curriculum that offers flexibility, especially through the mandatory electives across different studies such as computer science or applied mathematics courses. The programme acknowledges that the course offering in the IST track is limited in breadth relative to the entire cybersecurity field, and that there are opportunities to expand course offerings through collaboration with other universities or organizations such as Jheronimus Academy of Data Science (JADS). The panel agrees, and recommends continuing expanding course offerings in the IST track in order to strengthen its programme profile.

Admission and language of instruction
The BCS programme has a numerus fixus of 375 with a typical intake of around 350 students. Candidates must participate in a selection procedure that ranks applicants. The selection is based on timely completion of a motivation and capacities questionnaire, the grade point average of applicants' previous education, and the score on three online tests (on mathematics, logical reasoning, and algorithmic thinking). For the CSE programme, direct admission is granted to students with a bachelor degree in Computer Science obtained at a Dutch university. Applicants with non-Dutch or non-Computer Science bachelor degrees are reviewed by an admissions committee. The master offers pre-master programmes to prepare students with a Dutch higher vocational education degree for admission. Homologation courses may be required to cover student deficiencies in prior knowledge. For admission into the IST track, specific subject-related knowledge and skills are required.

Both programmes have English as the language of instruction and use an English language name, primarily driven by the professional and international context of the computer science field. English is the dominant professional language in the computer science domain and predominantly used by many large companies in the Brainport region where graduates find employment. Additionally, the use of English prepares graduates for international careers, and it attracts international talent both in terms of students and staff to the programmes. The programmes require proficiency in English (CEFR level C1 or higher) for students and teachers, with English proficiency of students checked during admissions and for scientific staff through an assessment. Roughly 80% of the bachelor intake is international, for the master this is around 50%.

The panel finds that both programmes have clear and appropriate admission requirements, which ensure that incoming students possess the necessary foundational knowledge and skills. The admission procedure for the CSE programme provide provisions for addressing knowledge gaps and preparing students adequately for the curriculum. For both programmes, the panel supports the use of English as the default language of instruction, and for the programmes names. It is important for preparing students for the international job market, and for attracting international students and staff. Also, it fits the international orientation and graduate profile of the programmes. The panel notes the challenge posed by Dutch government policies that might enforce teaching in Dutch, but considers that English remains appropriate, also given the international nature of the field and the Brainport region. The English proficiency requirements for teaching staff and students satisfy the panel.

Learning environment (both programmes)
Both programmes provide several support roles to assist students throughout their studies, each with distinct functions. Academic advisors provide personalized guidance on study progress, university regulations, and elective choices. They organize kick-off meetings and are accessible for advice. Teaching assistants facilitate education by guiding small groups, assisting with project courses, and providing

feedback on assignments. Student mentors, often students from earlier cohorts assigned to first-year students, offer practical and study-related guidance. Study and career orientation is also provided via SCOP/e, a programme designed to support students in choosing their personal study and career path. It focuses on the personal development of students and their study skills, and on career orientation through activities such as workshops on cv writing and an alumni night. The study association GEWIS supports students by facilitating communication between students and staff through round-table discussions. They also enable industry connections and assist in career orientation. There is an international office that organizes activities to make international students feel at home. Students with additional support needs (including functional impairments) have access to various guidance and support services. For instance, academic advisors can refer students to the university's central team of coaches, counsellors, and psychologists for additional support for wellbeing and personal challenges. The teaching staff receives pedagogical training with attention for inclusivity and support.

For both programmes, Canvas is the primary learning management system used for communication and interaction between students and teachers in the programmes. When courses are running, Canvas serves as the main platform where students can find course-related information and engage with peers and instructors, for example through discussion forums where questions can be posed and answered. Other digital tools used to enhance communication and interaction are FeedbackFruits (for communication and interaction, particularly supporting group assignments through peer feedback, peer review, and the use of rubrics), ANS (for administering homework assignments and exams, facilitating feedback via grading models and criteria, and enabling students to ask questions about their grading), Schoolyear (a platform in pilot phase used to secure invigilated digital tests under the Bring Your Own Device policy), and Sowiso (used for homework assignments and intermediate tests, integrating automated feedback for formative assessment).

Based on the documentation and discussions during the site visit, the panel finds that the learning environment of the programmes supports students in achieving their intended learning outcomes. Students receive substantial personal guidance from academic advisors and mentors, and professional and personal development are well addressed through the SCOP/e programme. Personal supervision and mentoring are highly appreciated by the students, as is the experienced atmosphere. The panel recognizes that there is a good support system in place, also for students with additional support needs. The panel acknowledges the importance of close supervision and guidance and encourages their continuation to maintain and improve student satisfaction and success. The various information and communication platforms enable student access to course content, facilitate communication, provide timely feedback, and support assessment activities in both individual and group settings.

The panel understands there are staff and student concerns about infrastructure limitations, such as limited availability of large lecture halls and study and collaboration spaces. Streaming lectures due to space limitations has led to reduced campus attendance of bachelor students, while students from the master are in need of more dedicated spaces for thesis work and group collaboration. The programmes try to balance increasing student numbers with available resources. Two new buildings are planned: a laboratory building and one with additional teaching rooms, including a large 600-seat hall and two 300-seat rooms (which will take some time to complete). In addition, there are plans to use existing rooms more efficiently by redesigning them. It pleases the panel to see that the programmes undertake action to mitigate the infrastructure limitations. This is essential to maintain the quality of education and to accommodate the expected growth in student numbers without compromising the teaching-learning experience. While the university has plans for new buildings, these solutions will take time to realize. Therefore, the panel recommends implementing temporary and medium-term measures as well to optimize the use of existing spaces, such as creative scheduling or splitting groups.

Learning environment: B Computer Science and Engineering
Students in the BCS programme attend lectures, supplemented by small group sessions. Group sessions are facilitated by student assistants and tutors who help with exercises, programming assignments, and projects. Students usually take three courses per quarter simultaneously. They engage with the professional field, among others through the Software Engineering Project where they work with real customers. For BCS students, the average study duration in 2023-2024 was three years and five months. Of the 2020-2021 cohort, 72% graduated within four years. The percentage of students receiving a positive binding recommendation for continuation of their studies has been steadily increasing.

The panel finds that the bachelor actively implements blended teaching methods, with a strong focus on interactive and applied learning. It considers the programme to be feasible and the average study duration to be good. BCS students do experience a high workload, which can partially be linked to the large number of intermediate assessments and group projects. Students report limited breathing space, which sometimes leads to increased stress levels. The panel suggests to actively seek opportunities for providing students with sufficient breathing space to support their wellbeing. This could involve better coordination of deadlines to avoid clustering of assessments, reducing the number of intermediate tests, and introducing minibreaks during the academic year.

Learning environment: M Computer Science and Engineering
The learning environment for CSE students is a combination of lectures, challenge-based courses and design projects. Students get in touch with the industry, mainly through optional internships or thesis projects conducted at companies, and guest lectures by industry experts. For regular CSE students, the average study duration in 2023-2024 was two years and nine months. Of the 2020-2021 cohort, 58% of the students graduated within three years. For the IST track, average study duration was two years and eight months, with 64% graduating within three years.

The panel finds that the mixed teaching methods and links to professional practice help students not only in understanding theory but also in applying it academically or technically. The programme is considered feasible, and the average study duration is acceptable. The panel encounters differences in study duration among students, where Dutch students, in comparison to international students, typically have more personal resources to prolong their thesis trajectory. This signals an unlevel playing field (students who have more time to finish their thesis have more room to score higher grades) and could impact perceived fairness by students. In addition, prolonged thesis trajectories increase supervision workload. The programme is making plans to streamline the graduation project and its preparation phase, in order to improve manageability for students and to reduce supervisors' workload. The panel considers this a positive change, and additionally suggests exploring opportunities to ensure a level playing field for timely thesis completion for all students.

Teaching staff
The teaching staff for both the bachelor and master primarily consists of academic personnel from the M&CS department, and includes experts from various domains, notably Computer Science, Mathematics, and Data Science. They maintain close connections to current research and the professional field, with many staff members involved in both teaching and active research. Several hold hybrid appointments, working part-time in the industry alongside their academic roles. All lecturers have obtained the University Teaching Qualification (UTQ), are close to obtaining it, or are being exempted due to demonstrated teaching competence. The TU/e's Academy for Learning and Teaching offers teaching staff continuous professional development opportunities, including workshops and networking events to support education innovation and pedagogical skill enhancement. There are specific initiatives to train teaching assistants and PhD

students who play an important role in supporting education. Multiple programmes aimed at education innovation, among others focused on leveraging ICT, have been initiated. In response to increasing student numbers, the department hired extra assistant professors and university teachers. There are plans to continue expanding the staff base.

Based on the documentation and discussions during the site visit, the panel finds that teaching staff is experienced, knowledgeable and motivated to support students on their learning journey. The close connections of teaching staff to research and the professional field help to keep the curricula aligned with industry developments and to enhance the practical relevance of the programmes. Students appreciate the teaching staff for their high level of expertise, motivation, and approachability. Students express that lecturers are knowledgeable in their fields and dedicated to student learning. The engagement of the teaching staff is reflected in their willingness to accept and act on student feedback, as well as in the timely and constructive feedback provided by student teaching assistants and tutors. The professional attitude and support of (teaching) staff remain highly regarded by students from both programmes.

The panel finds that the programmes have energetically followed up on the recommendation of the previous panel to address growth and education innovation challenges. The programmes recognize that the increase in student numbers still outpaces the increase in staff. The panel recommends allocating adequate time for teaching staff to engage in education innovation and professional development activities. Additionally, it highlights the necessity to proactively manage and mitigate staff workload issues, especially in light of the anticipated growth in student enrollment, and (for the BCS programme) the extra effort required for supervising and assessing the individual BEP.

Considerations

The panel values the coherent and well-structured curriculum of the BCS programme, which is organized along clearly defined learning lines, effectively aligns with its intended learning outcomes, and balances theoretical knowledge and applications. The curriculum of the CSE programme is appreciated by the panel for being appropriate and well-designed, and for offering valuable opportunities for students to specialize in one of the three focus areas. The panel recommends the CSE programme (regular) to develop clearer study paths, while the IST track is encouraged to expand its course offerings.

The panel looks positive at the stimulating and supportive learning environment of the programmes, which effectively motivates students and fosters the achievement of intended learning outcomes. The international and inspiring atmosphere is enhanced by diverse teaching methods and strong connections to professional practice. The SCOP/e programme, together with personal supervision and mentoring are strong: they help students develop professional skills, support them in making informed decisions about their personal study and career paths, and contribute to overall student wellbeing. In both programmes, the comprehensive information and communication platforms facilitate access to course content, communication, timely feedback, and assessment, and create a truly student-centered experience. The panel recommends implementing temporary and medium-term measures to optimise the use of existing spaces.

The panel values the teaching staff for being highly experienced and knowledgeable in core areas of computer science and related fields, and for being committed to continuous professional development. The strong ties of teaching staff to both research and industry help in delivering curricula that remain current and practically relevant. It is a nice compliment that students consistently appreciate the timely, constructive feedback of teaching staff, their approachability, and their openness to incorporating student input. It pleases the panel to see that staff is provided with structural opportunities for pedagogical training and innovation. The panel recommends the continuation of allowing sufficient time for teaching staff to engage

in education innovation and professional development activities, and the proactive management of staff workload. Special attention should be paid to the extra effort required for supervising and assessing the individual Bachelor Final Project.

Conclusion

The panel concludes that the bachelor's and master's programme meet standard 2.

Standard 3. Student assessment

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

Findings

System of assessment

The assessment system of both programmes is grounded in the TU/e Exam Framework and the TU/e Quality Assurance Framework. These frameworks provide a set of policies and quality standards which emphasize the integration of education and assessment, academic integrity, and the responsibilities in maintaining educational quality. The M&CS department has developed, and recently updated, an integrated Quality Assurance and Assessment Policy. This policy outlines how the department safeguards the quality of its education programmes and assessments. It sets objectives and applies structured quality assurance and monitoring mechanisms at the programme, course, and individual level. Both programmes have detailed assessment plans to enhance clarity and transparency in evaluating student performance. These plans incorporate a diverse range of formative and summative assessment methods, including written exams, practical assignments, projects, and peer reviews. The programmes opt for a combination of individual and group work to help students develop a broad range of skills, from technical proficiency to teamwork and communication. The platform ANS is widely used to administer tests and provide clear, transparent feedback with grading models and assessment criteria. It supports various digital assessment tools, including Canvas for quizzes and peer review, ANS for assignments and exams, and other tools like FeedbackFruits for group assignments. For major assessments like the graduation projects, the programmes apply the four-eyes principle, which involves having at least two assessors in order to reach consistency in assessment. In addition, exam questions are always checked by a second teacher.

In the BCS programme, most courses conclude with a final written exam, complemented by various intermediate assessments that are predominantly formative. These intermediate assessments include practical assignments such as coding, hardware design, data analysis, formal specifications, homework assignments, presentations, and essays. They serve not only as tools for feedback but also to encourage good study habits, particularly in the beginning of the programme. The grading of intermediate assessments is typically performed by instructors and student assistants under supervision. Additionally, some courses incorporate peer review mechanisms which allow students to provide feedback on each other's work or to assess contributions within group projects.

In the CSE programme (regular), most courses have a final exam or presentation as a summative assessment. Formative intermediate assessments such as practical assignments, essays and project work are commonly used throughout the various courses. Intermediate assessments provide regular feedback and help students tracking their progress and deepening their understanding of knowledge and skills. Group projects are an important element of the assessment and are used to prepare students for real-world collaborative work environments. To ensure fairness and individual accountability within group work, peer review mechanisms are incorporated, where students evaluate the contributions of their fellow group members. Assessments in

IST courses rely more heavily on final exams, in addition to other types of assessments such as presentations and feedback during projects or interim assignments.

Based on the documentation and discussions during the site visit, the panel sees that both programmes have a clear assessment policy in place, including a four-eyes policy for graduation projects. The programmes deploy diverse assessment methods, combining theory and applications as well as group and individual assessment. From the discussion with the students, it becomes clear to the panel that students appreciate the transparency of assessment requirements (including mock exams), which makes clear what is expected from them, and that they generally find the grading to be fair. The programmes rely, among others, on round table discussions with students and student surveys to continuously improve assessment policy and practices.

The BCS programme offers students multiple feedback moments in courses, especially in the first year, including weekly or biweekly intermediate assessments such as assignments and tests. These help students keep track of their learning progress and prepare for final exams. The panel understands that there are some challenges related to the logistical support and resources (encompassing the combination of physical spaces, technical infrastructure, and organizational support) needed to sustain these assessments effectively. Organizing these tests is labor-intensive, despite the use of student assistants, and staff indicate better organizational support in terms of space and invigilation is welcome. The panel recommends strengthening central support for intermediate summative assessments by investing in adequate facilities, technical support, and logistical arrangements. This enhancement would enable more efficient administration of assessments, including timely and effective feedback to students.

Thesis assessment: B Computer Science and Engineering
Up to and including the academic year 2024-2025, the Bachelor Final Project was the Software Engineering Project (SEP). Currently, students participate in the SEP at the beginning of year 3. At the end of the project, project groups hand in several components, including a user requirements document, an acceptance test plan, and a software transfer document. Each group also gives a presentation/demo to the customer. Students are assessed both as a group and individually. The group grade is determined using a detailed rubric completed by at least two assessors, including the supervising staff member. The rubric evaluates the team's overall performance on the project. Individual students receive a correction to the group grade based on their personal contribution. This individual adjustment is informed by peer reviews, the judgment of project managers, and the supervisor's assessment. All reviews come with a motivation, and the proposed individual adjustment is discussed with the group supervisor to support fair grading. Starting in the third quartile of the current academic year, the Bachelor Final Project will be an individual, research-oriented project. In the new set-up, each student is assessed individually by two staff members, based on a portfolio which includes a final report of the student.

The panel reviewed a number of SEPs and finds that the grading structure is clear and well-documented, with detailed rubrics used to determine group grades and individual corrections. Assessment of the SEPs is transparent, and the multi-assessor approach increases the reliability and fairness of the assessment. The panel largely concurred with the grades awarded, finding that these grades were generally well supported by the accompanying assessment forms.

The panel understands that peer review is an important component of the SEP assessment. While the panel appreciates this component, it was not always entirely clear what the individual contributions of the students within the group work were. In addition, some students report concerns about freeriding. Therefore, the panel suggests to further improve the transparency and fairness of individual assessment

within the SEP assessment. This could involve refining the assessment criteria and processes to better differentiate individual efforts in group work, and providing more detailed and transparent feedback to students regarding their grades.

Thesis assessment: M Computer Science and Engineering
The master thesis in the CSE programme is an individual research project on a state-of-the-art topic within the field of Computer Science and Engineering. About half of the graduation projects in CSE and IST are conducted externally, often at companies within the Brainport region. Students deliver a report, a presentation, and an oral defense. The assessment includes evaluation of the student's independence, communication skills, and the scientific quality of the research. Assessment is done by three assessors, including the supervisor and a staff member from a different cluster, using rubric-based assessment forms. The programme considers to move to a four-eyes approach, with less restrictive assessor choices, to manage staff workload.

The panel reviewed a sample of thesis assessment forms. The panel recognizes a good quality of thesis supervision and assessment, and largely agreed with the awarded grades. The use of rubrics enhance transparent and consistent grading, and the application of the six-eyes principle enhances the validity of the assessment, as does the assessment of multiple elements including a presentation and oral defense. The panel understands the motivation of the programme to move to a four-eyes approach. There is calibration among staff through the inclusion of an independent member from a different cluster to maintain reliable assessment. The panel values this calibration, but at the same time feels there is a need for explicit statements that clearly express what is needed to achieve the score insufficient, sufficient, good, very good, excellent for each rubric (and in particular to make the difference between insufficient and sufficient). The panel believes that a more detailed substantiation of the thesis grade will further increase the transparency and fairness of the assessment. The panel recommends considering the inclusion of clearly defined pass/fail thresholds and comprehensive guidelines for thesis grade substantiation. Such changes may further improve the consistency, transparency, and fairness of thesis assessment. In addition, the panel recognizes that, currently, the assessment rubric for the CSE programme is generic and used across different master's programmes. While this clearly helps in maintaining coherence and consistency in assessment practices, specifying the rubric could enhance alignment with the intended learning outcomes of the programme. The programme may consider a hybrid approach: maintaining a core generic rubric framework supplemented with programme-specific criteria or explanatory notes that reflect distinctive learning outcomes and assessment expectations.

Examination committee
The examination committee for Computer Science at TU/e is responsible for the BCS and the CSE programme as well as for the MSc Embedded Systems. It operates with a structured organization including two subcommittees: a daily affairs subcommittee (comprising the chair, vice-chair, and secretary) that handles routine matters, and a quality assurance subcommittee that specifically monitors the quality of assessments. The quality assurance subcommittee conducts activities such as sampling graduation theses and investigating courses with outlier grades. Students can contact the examination committee through the Osiris platform, which provides a formal channel for communication and handling of exam-related matters. The committee enforces several quality standards and policies, including the four-eyes principle: exam questions must be checked by a second teacher before administration, and assessment committees for thesis projects include an independent member to accommodate unbiased grading. Furthermore, the committee systematically analyzes final thesis assessments and SEPs to verify that grading is well justified and consistent with the assessment criteria. This is documented in their annual quality assurance reports. The examination committee also monitors the documentation of assessment plans and approves changes.

The panel sees that the examination committee fulfils its legal duties in a professional manner. The committee demonstrates diligent and well-organized operations, and maintains effective communication and a strong connection with the programmes' management. The committee possesses the appropriate expertise and operates effectively, particularly in overseeing the quality of final assessments. This is evidenced by the committee's practice of conducting annual quality control cycles, during which they review samples of master theses and exams to ensure that grading is consistent and in line with established assessment criteria. These efforts contribute significantly to the reliability and fairness of the graduation project assessments. The panel identifies an opportunity to broaden this quality assurance approach beyond final projects to encompass a wider range of courses and assessments across the programmes. Expanding the scope of scrutiny could help detect inconsistencies in assessment practices earlier and more systematically, and improve overall assessment quality and alignment with intended learning outcomes.

Artificial Intelligence

In response to the emergence of generative AI tools, TU/e has communicated general rules on AI use in education to staff and students. The examination committee actively monitors and addresses the impact of AI on the validity and integrity of assessments. For example, it has organized a joint AI Assurance Committee within M&CS in 2024, to investigate risks and propose mitigation strategies related to AI usage in student assessments. The department has also implemented regulations prohibiting the misuse of AI tools as outlined in the examination committees' regulations on fraud and prevention measures. Some courses have adapted intermediate assessments to prevent students from submitting AI-generated work (e.g., changing assignments into preparatory exercises followed by in-class tests and oral exams). Students are educated on the risks and benefits of using generative AI, and the programmes plan further sessions to guide proper AI use.

The panel finds that that the programmes, supported by the M&CS department, show a very active stance towards AI and how this can impact assessment. There is strong awareness at all levels of the programmes, including the examination committee. The panel agrees with the programmes' approach of combining top-down general rules and bottom-up initiatives. The panel encourages the continuation and expansion of these efforts, including establishing structured assessment plans and sharing experiences across programmes to ensure that assessment quality and academic integrity are maintained in an AI-augmented educational environment.

Considerations

The panel compliments the programmes with having an elaborate, valid, reliable, and transparent system of assessment that includes diverse and balanced assessment methods, and a multi-assessor approach for final projects. The programmes provide students with a nice blend of theory and practical work, and individual and group assessment. For the BCS programme, the panel recommends strengthening central support for intermediate summative assessments by investing in adequate facilities, technical support, and logistical arrangements. For the CSE programme, the panel recommends considering the inclusion of clearly defined pass/fail thresholds and comprehensive guidelines for thesis grade substantiation.

The panel values the central role of the examination committee in maintaining the academic quality and fairness of the assessment. The active stance of the programmes towards generative Artificial Intelligence pleases the panel: actions taken are appropriate, timely, and aligned with best practices.

Conclusion

The panel concludes that the bachelor's and master's programme meet standard 3.

Standard 4. Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Theses

Prior to the site visit, the panel studied the final products of 38 bachelor's students (four Software Engineering Projects) of the BCS programme and 15 theses of the CSE programme, including the accompanying assessment forms and distributed over the regular programme and IST track. For the BCS programme, the panel finds that the deliverables in the SEPs demonstrate a high quality and reflect strong academic standards. Teamwork is well established within these projects and shows that students manage to collaborate effectively. In the student output, the panel recognizes solid subject-specific knowledge and technical competence. The panel sees an opportunity for deepening aspects of societal impact and critical reflection, which could be made a point of attention in the new, individual Bachelor Final Project as well. For the CSE programme, the panel sees that the master theses consistently demonstrate a high level of technical and analytical quality. A substantial fraction of the theses lead to publications, testimony to the academic excellence fostered within the programme. Similar to the bachelor, there remains an opportunity to further enrich the theses by incorporating more critical reflection on ethics and the societal aspects of computer science. Societal aspects are sometimes mentioned, but could be more thoroughly analyzed or integrated into the thesis work. This could involve integrating structured reflection components into thesis guidelines and supervision practices to ensure that graduates are not only technically proficient but also socially and ethically aware, which would broaden the impact and relevance of the research.

Performance of graduates

Approximately 53% of BCS graduates continue with a master programme at Eindhoven University of Technology, and a significant portion transitions into the job market. Graduates quickly find employment in the software industry. In a survey among SEP customers, 63% rated the performance of BCS graduates as good and 32% as excellent. CSE graduates are highly sought after and well-positioned for both industry and research roles. The 2023 National Alumni Survey, completed by 35 CSE alumni, painted a positive picture: alumni generally hold jobs closely aligned with their education and express satisfaction with the programme, while 77% would choose to pursue the same programme at TU/e again. Further feedback from an extended alumni group of 77, including the IST track, confirms a substantial alignment between their professional roles and the programme content, with most recommending the programme to prospective students.

Based on the documentation and discussions during the site visit, the panel finds that both programmes demonstrate that their graduates achieve the intended learning outcomes and are well-prepared for their professional careers. Graduates from both programmes are highly regarded by employers and typically secure relevant employment promptly after completing their studies. The high quality of the software engineering projects underlines the effectiveness of the BCS programme in preparing students for both academic and professional success. The CSE programme delivers graduates who are well-positioned for both leadership roles in industry and doctoral research. The panel feels this reflects the programme's balanced focus on academic and practical skills, and indicates that the programme equips students effectively.

Considerations

The panel appreciates the technical and analytical quality of the SEPs and the master theses, which reflect the practical and academic excellence fostered within the programmes. The programmes can be proud of

delivering graduates that find relevant employment quickly and are highly regarded by employers. The quality of final projects and the performance of graduates demonstrate that students of both programmes achieve the intended learning outcomes.

Conclusion

The panel concludes that the bachelor's and master's programme meet standard 4.

General conclusion

The panel's assessment of the bachelor Technische Informatica and the master Computer Science and Engineering is positive.

Recommendations BCS and CSE

1. Re-install an external advisory board for the computer science domain.
2. Implement temporary and medium-term measures to optimize the use of existing spaces.
3. Continue allowing sufficient time for teaching staff to engage in education innovation and professional development activities, and proactively manage staff workload.

Recommendations BCS

4. Incorporate in the ILOs topics of security, privacy, and Artificial Intelligence.
5. Strengthen central support for intermediate summative assessments by investing in adequate facilities, technical support, and logistical arrangements.

Recommendations CSE

6. Expand the domain-specific ILOs and develop clearer study paths, while also increasing the focus on interdisciplinary and ethical aspects.
7. Continue expanding course offerings in the IST track.
8. Consider the inclusion of clearly defined pass/fail thresholds and comprehensive guidelines for thesis grade substantiation.

Appendix 1. Intended learning outcomes

Bachelor Computer Science and Engineering

General Bachelor College ILOs

Graduates:

- BC1: are academically qualified to degree level within the domain of engineering science and technology.
- BC2: are competent in the relevant domain-specific discipline(s) at the level of a Bachelor of Science (as specified below in the ILOs for BCS).
- BC3: are able to conduct research and design under supervision.
- BC4: are aware of the significance of other disciplines.
- BC5: take a scientific approach to non-complex problems and ideas, based on current knowledge.
- BC6: possess intellectual skills and are able to reflect critically, reason and form opinions under supervision.
- BC7: have the ability to communicate the results of their learning, thinking, acts and decision-making processes.
- BC8: can plan and execute their activities.
- BC9: are aware of the temporal and societal contexts of science and technology (understanding and analysis).
- BC10: in addition to a recognizable domain-specific profile, possess a sufficiently broad basis to be able to work or collaborate in an interdisciplinary and multidisciplinary context. Here, multidisciplinary means focusing on other relevant disciplines needed to solve the design or research problem in question.

Programme-specific ILOs

- CS1: Graduates have foundational knowledge and understanding of mathematics for computer science, programming and computer systems.
- CS2: Graduates have in-depth knowledge and understanding of algorithms, the theory of computing, modelling and analysis of information, software development, and the design and architecture of systems.
- CS3: Graduates can develop algorithmic solutions to computational problems; they can formally prove the correctness and analyze the computational complexity of these solutions.
- CS4: Graduates can determine requirements for medium scale software projects and develop software that demonstrably meets these requirements.
- CS5: Graduates can model medium scale systems and formally evaluate their correctness and performance.
- CS6: Graduates can identify parts of larger real-world problems for which a computational solution can be developed; they can formulate the corresponding computational problem at a suitable level of abstraction.
- CS7: Graduates can evaluate the quality, suitability, and feasibility of solutions to computational problems.
- CS8: Graduates can communicate clearly and effectively, both within the scientific and professional community and society at large; they can comprehend and produce effective reports and

documentation describing complex engineering and scientific activities; they can prepare and deliver effective presentations.

- CS9: Graduates have the attitude necessary to successfully continue their study at the level of a master's program: they are proactive self-learners, who can break down a problem into meaningful parts and acquire knowledge from the literature to solve each subproblem; they are open to new developments and ideas in the field of computer science.
- CS10: Graduates show the attitude of a responsible academic engineer: they have a reflective and critical attitude towards themselves and the field of computer science, including an ethical and societal awareness and responsibility regarding the innovative possibilities and limitations of the field.

Master Computer Science and Engineering

General Graduate School ILOs

The graduate:

1. is academically qualified to degree level within the domain of 'science, engineering & technology'.
2. is competent in the relevant domain-specific discipline(s) at the scientific master's degree level.
3. is able to conduct research and design independently.
4. has the ability and attitude to include other disciplines in their research, where necessary.
5. has a scientific approach to complex problems and ideas.
6. possess intellectual skills that enable them to reflect critically, reason and form opinions.
7. has the ability to communicate the results of their learning, thinking and decision-making processes at an international level.
8. is aware of the temporal and societal context of science and technology (comprehension and analysis) and can integrate this context in their scientific work.
9. in addition to a recognizable domain-specific profile, possesses a sufficiently broad basis to be able to work or collaborate in an interdisciplinary and multidisciplinary context. In this context, multidisciplinary means being focused on other relevant disciplines needed to solve the design or research problem in question.
10. has the ability and attitude to seek new potential applications, taking the societal context into consideration.

Programme-specific ILOs

11. has a broad view of Computer Science and its applications, demonstrated by knowledge of
    a. Reasoning about computation and/or system behavior in a mathematically rigorous manner and coping with complexity (focus area Algorithms and Theory).
    b. Modeling, designing, implementing, analyzing and verifying computational and data-intensive systems (focus area Architecture and Systems).
    c. Designing and implementing high-quality software systems by applying suitable information-analysis techniques such as data mining, process mining and visualization (focus area Software and Analytics).
12. Has expertise and can conduct research in one of these three focus areas.

Information Security Technology ILOs (track)

The graduate:

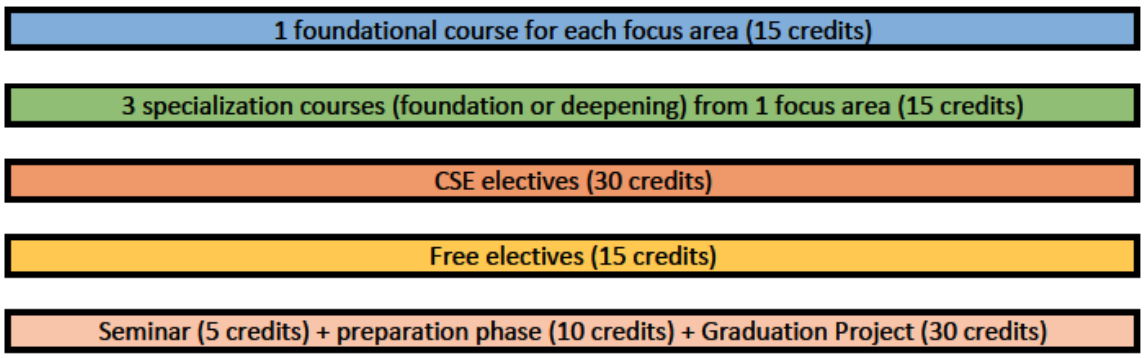
1. is qualified to masters level in the domain of science, engineering and technology.
2. is competent in the relevant domain-specific discipline, namely computer science and engineering.
3. approaches computer science problems in a thorough and scientifically founded manner.
4. is capable of critical thinking, can reason logically and form opinions.
5. has design skills, presentation skills, and communication skills.
6. has insight into the role of computer science in industry, society, and science.
7. and, in addition to a recognizable domain-specific profile, possesses a sufficiently broad basis to be able to work in an interdisciplinary and multidisciplinary context.
8. is capable of acquiring knowledge independently.
9. has a broad view of information security.
10. is able to evaluate existing and newly designed security systems.
11. is an expert in at least one subarea of information security.
12. can contribute to discussions about the role of information security in our society.
13. has experience in the process of specifying, designing, and realization of an application in which security plays an important role.
14. is able to list relevant security requirements in an application and to select the right techniques to address these issues.

Appendix 2. Programme curriculum

BSc Computer Science and Engineering

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
YEAR 1	Calculus 2WBB0 / B	Linear Algebra and Applications 2DRR00 / C	Probability and Statistics for CS 2DRR10 / A	Software Design 2IRR00 / D
	Programming 2IP90 / E	Discrete Structures 2IT80 / E	Data Structures 2IL50 / B	CBL Autonomous Systems Twinning 2IRR10 / B + C + E
	Logic & Set Theory 2IT60 / D	Foundations of Data Analytics 2IAB1 / A	Computer Systems 2IC30 / E + (C or D)	ITEC Ethics of technology and engineering 0LVX10 / A
YEAR 2	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	Software Specification 2IX20 / D	Automata and Formal Languages 2IRR90 / B	Algorithms 2ILC0 / C	Statistics and Machine learning 2IRR50 / A
	Networks 2IRR20 / E	Datamodeling and Databases 2ID50 / E	Operating systems 2INC0 / D	Multidisciplinary CBL 4CBLW00 / C + D
	Elective	Elective	Elective	Security 2IRR40 / E
YEAR 3	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	Software Engineering Project (SEP) 2IRR30 / D		Bachelor Final Project (BEP) 2ICS00	
	Choose one of the capstone courses 2IRR60, 2IRR70, 2IRR80 (see below)	Elective	ITEC Engineering for society 0LVX20 / B	Elective
	Elective	Elective	Elective	Elective
LEGEND	Foundations	Algorithms & Theory of Computing	Software Development	Systems
	Courses offered by other departments			

MSc Computer Science and Engineering



The CSE Master curriculum distinguishes three focus areas:

- **Algorithms and Theory,**
- **Architecture and Systems,**
- **Software and Analytics.**

Each of these focus areas is captured by a set of **foundational courses** and **deepening courses**. Students obtain breadth in research by selecting a foundational course from each focus area, (15 EC in total) and specialize in one of the focus areas by selecting additional foundational or deepening courses (15 EC in total). The remainder of the curriculum is dedicated to CSE-specific (30 EC) and free (15 EC) electives, a seminar (5 EC) and the preparation (10 EC) and execution (30 EC) of the Graduation Project.

The IST track has a different set-up with five mandatory courses (25 EC), three IST-specific electives (15 EC), 35 EC of free electives and a IST-specific seminar (5 EC). As with the CSE track, the programme is concluded with a 40 EC Graduation project. The IST-specific courses are:

	code	*course name (boldface is mandatory)*
Q1	2MMC10	**Cryptology**
	2IMS25	**Principles of Data Protection**
Q2	2DMI20	**Software Security**
	2IMS20	**Cyberattacks Crime and Defenses**
	2DMI10	Applied Cryptography
Q3	2IMS30	**Advanced Network Security**
	2IMS15	Verification of Security Protocols
	2DMI00	Cryptographic Protocols
	2IMS40	Intrusion Detection Laboratory
Q4	2IMS00	**Seminar IST**
	2IMS50	Introduction to Quantum Computing and Security
Q5	2IMS10	Physical Aspects of Digital Security

Appendix 3. Programme of the site visit

Monday 3 November 2025

12.30 – 13.30 Arrival and preparation (incl. lunch)
13.30 – 14.30 Interview program management BCS + CSE + DS&AI
14.30 – 15.00 Internal panel meeting
15.00 – 16.00 Interview BCS + CSE students and alumni
16.00 – 16.15 Short break
16.15 – 17.15 Interview BCS + CSE teaching staff
17.15 – 17.45 Internal panel meeting

Tuesday 4 November 2025

08.45 – 09.30 Arrival and preparation
09.30 – 10.15 Interview Examination Committees
10.15 – 10.30 Short break
10.30 – 11.00 Thematic session 1
11.00 – 12.30 Internal panel meeting and lunch
12.30 – 13.15 Interview DS&AI students and alumni
13.15 – 13.30 Short break
13.30 – 14.15 Interview DS&AI teaching staff
14.15 – 14.45 Long break
14.45 – 15.45 Thematic session 2
15.45 – 16.00 Short break
16.00 – 16.45 Tour of the facilities
16.45 – 17.30 Internal panel meeting

Wednesday 5 November

08.45 – 09.15 Arrival and preparation
09.15 – 10.15 Thematic session 3
10.15 – 10.30 Short break
10.30 – 11.30 Thematic session 4
11.30 – 12.30 Lunch and internal panel meeting
12.30 – 13.15 Concluding session program management BCS + CSE + DS&AI
13.15 – 14.30 Internal panel meeting
14.30 – 14.45 Oral feedback

Appendix 4. Materials

Prior to the site visit, the panel studied the final products of 38 bachelor's students and 15 masters's students. Information on the products is available from Academion upon request. The panel also studied other materials, which included:

- Reading Guide
- Student Chapters
- SWOT analyses
- Curriculum overviews
- Reports previous accreditation
- Learning Outcomes
- Programmes' vision
- Language policy
- Annual Reports Board of Examiners and Programme Committee
- Study guides
- Student journeys through the programmes
- Education and Exam Regulations
- Assessment plans
- Example course assessments
- Staff overview
- UTQ regulations
- Graduation project manuals and grading forms
- Alumni survey outcomes
- Documents on organizational setting and context
- Questions thematic sessions