



B Computer Science
Vrije Universiteit Amsterdam

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info@academion.nl

Project code P2409

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Summary

Standard 1. Intended learning outcomes

The panel appreciates the dual focus of the bachelor's programme Computer Science (CS) on both research and practice. The panel recommends that the programme finalizes its vision document to help making sound strategic choices going forward.

The aims of the programme have been translated into a coherent set of intended learning outcomes (ILOs) that are properly aligned with the requirements of the academic and professional field and with global standards of computer science education. Furthermore, the panel recommends updating the ILOs in view of generative AI developments. The panel is satisfied that the programme has a Professional Advisory Board as a means to keep the ILOs connected to the requirements of the professional field.

Standard 2. Teaching-learning environment

The curriculum of the bachelor's programme CS enables students to achieve the intended learning outcomes of the programme. The curriculum is coherent and well-structured; the programme uses several activating teaching methods that support its dual focus. The panel recommends that the programme explicitly and recognizably exposes all students to more research skills in the mandatory part of the programme, further strengthening the research methodology learning line, including topics such as academic writing.

The programme is feasible and student support/guidance is up to standard. The teaching staff is well-qualified, both in terms of academic activities and teaching qualifications. The panel appreciates the co-teaching method. The panel suggests that more senior female staff become visible to serve as role models for the female students.

The panel finds that the programme deploys ample initiatives to look after the quality and coherence of the programme. The programme is open to feedback and is willing to take measures to improve itself. The panel recommends that the feedback loop is explicitly closed by informing students of the measures taken in response to their feedback.

Standard 3. Student assessment

The programme has a reliable, valid, and transparent system of assessment in place. There are adequate procedures for design and quality assurance of exams and assignments.

With regards to the bachelor projects, the panel finds that the rubric deserves an update and the requirements regarding the independence of the second assessor need strengthening. The panel encourages the programme to ensure that motivations are always given to justify and substantiate grades given.

The panel is satisfied that the programme has a strong and pro-active Examination Board that fulfils its legal duties.

Standard 4. Achieved learning outcomes

The bachelor projects show that students realize the intended learning outcomes of the programme. Alumni either enter the job market or progress to a (specialized) master's programme and subsequently find a job in the field of their choice.

Score table

The panel assesses the programme as follows:

B Computer Science

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

Prof. dr. ir. Bart Preneel,
Panel Chair

Drs. Linda te Marvelde,
Secretary

Date: 20 March 2026

Introduction

Procedure

Assessment

On 24 & 25 November 2025, the bachelor's programme Computer Science the Vrije Universiteit Amsterdam (hereafter: VU Amsterdam) was assessed by an independent peer review panel as part of the cluster assessment WO Informatica groep 3. The assessment cluster consisted of 27 programmes, offered by the Open Universiteit, Leiden University, the University of Groningen, Utrecht University, Radboud University, Eindhoven University of Technology, Delft University of Technology, Vrije Universiteit Amsterdam, the University of Amsterdam, and the 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 cluster WO Informatica groep 3. Peter Hildering and Yannick Slagter acted as coordinator in the cluster assessment. Linda te Marvelde acted as secretary for the assessment of the programmes of VU Amsterdam. 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 three 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 programme composed a site visit schedule in consultation with the coordinator (see appendix 3). The programmes selected representative partners for the various interviews. It was 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 period 2023 – 2025. In consultation with the coordinator, the panel chair selected 15 theses. 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 information file and additional materials (see appendix 4).

The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation report and the theses, as well as the division of tasks during the site visit. The panel was also informed on the assessment framework, the working method and the planning of the site visits and reports.

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 Faculty Beta Sciences at the VU.

Panel

The panel assessing the B Computer Science at the VU consisted of the following members:

- Prof. dr. ir. B. (Bart) Preneel, Full Professor Computer Security and Industrial Cryptography at the Faculty of Engineering, KU Leuven [chair];
- Prof. dr. M. (Marieke) Huisman, Professor Software Reliability at the Faculty of Electrical Engineering, Mathematics and Computational Sciences, University of Twente (UT);
- Prof. dr. F. (Fabiano) Dalpiaz, Professor Software Production at the Faculty of Beta Sciences, Utrecht University;
- Prof. dr. ing. N. (Norbert) Fuhr, Professor in Computer Science at the Faculty Computing Science, Universität Duisburg-Essen;
- I. (Imane) el Caïdi BSc, Master student Computer Science (track Algorithm Design and Analysis & Operations Research, Utrecht University [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:	Vrije Universiteit Amsterdam
Address:	De Boelelaan 1105, 1081 HV Amsterdam
Website:	www.vu.nl
BRIN-number:	21PL
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Computer Science
ISAT number:	50426
Orientation of the programme:	Academic
Level of the programme:	Bachelor (NLFQ 6)
Number of credits:	180 EC
Language of instruction:	English
Professional requirements:	no
Location:	VU Campus

Mode(s) of study:
Assessment group:
Awarded degree:
Submission date NVAO:

Full time
Informatica groep 3
BSc
1 May 2026

Description of the assessment

Organization

The bachelor's programme Computer Science is coordinated by the Computer Science Department of the Faculty of Science of VU Amsterdam. The programme is embedded in the Domain of Information Sciences of the faculty, which is headed by the Director of Education of the Faculty of Science, who acts in close coordination with the Vice Dean for Education. The faculty is managed by the Faculty Board, consisting of the Dean, the Vice Dean for Education and the Director of Operations.

The bachelor Computer Science is headed by a Programme Director who plays a vital role in the organization and quality assurance cycles of the programme. The Programme Director is supported by a Programme Coordinator, who is responsible for the day-to-day organization of courses and other activities related to education such as coordinating the programme teaching team meetings and providing advice to the Programme Director regarding the implementation of educational policies. This is done in consultation with the Education Office of the faculty.

The programme has its own programme committee (in Dutch: Opleidingscommissie/OLC) (see Standard 2). The Examination Board is organized at the level of the Faculty of Science (see Standard 3).

Recommendations previous panel

The programme's documentation included an overview of how it followed up on the recommendations given by the previous accreditation panel (2020). The panel finds that the recommendations have been largely acted upon by the programme; the panel is satisfied with the measures taken and sees that these have contributed to the improved quality of the programme. However, the recommendation concerning the increased exposure to research methodology skills throughout the programme, remains a work in progress. The panel will address this issue in Standard 2.

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 Computer Science (CS) is designed to equip students with a strong foundational and applied knowledge of computer science, enabling them to either pursue advanced studies in a master's programme in a CS-related field, or to transition into the IT industry as skilled and capable professionals. The panel appreciates the programme's dual approach (preparation for the work field as well as continued studies) and its alignment with international frameworks, as it adheres to the guidelines set forth by the Association for Computing Machinery (ACM). These guidelines emphasize critical areas such as computational theory, software design, system development, and practical problem-solving, all of which are essential for success in graduate studies. By embedding ACM principles into the programme, it aims to create a pathway for students to pursue research or advanced education, either at VU Amsterdam, in other Dutch universities, or abroad. Moreover, since CS is a multidisciplinary field, the programme chooses to offer a broad overview without giving preference to a specific subfield (breadth before depth). In this way, students can make a more informed decision on where to specialize themselves when doing a master programme.

The previous panel (2018) found that the programme would benefit from an explicit strategic vision on its future, taking into account the needs and interests of the programme, the staff, and the research groups. This recommendation was rooted in the non-realisation of the (faculty) merger of VU Amsterdam and the University of Amsterdam and the subsequent continued existence of two CS bachelor's in Amsterdam. Despite some progress having been made in the past few years (e.g. regarding vision on internationalization, language of instruction). The panel recommends that the programme further refine and complete its comprehensive vision document to clearly articulate its overarching goals and strategic direction. In addition, the dual focus of the programme, the diversity in students' backgrounds and aims, and fluctuations in student intake potentially create tensions for the organization and staff that require an active strategy (rather than self-organization). The panel argues that these kinds of tensions will be alleviated by adopting a clear(er) vision for the future of the programme (see Standard 2).

Intended learning outcomes

The ambitions of the programme have been translated into a clear and balanced set of eight intended learning outcomes (ILOs) (see Appendix 1). The panel deems the ILOs to be in line with the aims of the programme, including its level and orientation which is reflected in the structuring of the ILOs according to the Dublin descriptors, and subsequently with NLQF level 6 (bachelor's level). The panel recommends that the programme update the ILOs in view of generative AI (GenAI) developments, as these are not yet explicitly addressed. The panel is satisfied with the manner in which the programme keeps the ILOs and the curriculum up-to-date, e.g. via discussions with its Professional Advisory Board (PAB), which has an advisory role for the bachelor's programme CS, as well as for the master's programmes Computer Science and Computer Security.

Considerations

The ambitions of the bachelor programme CS are fitting for an academic bachelor's programme in this field. The panel appreciates the dual focus on both research and practice. The panel recommends that the programme finalizes its vision document to help making sound strategic choices going forward.

The aims of the programme have been translated into a coherent set of intended learning outcomes (ILOs) that are properly aligned with the requirements of the academic and professional field and with global standards of computer science education. Furthermore, the panel recommends updating the ILOs in view of generative AI developments. The panel is satisfied that the programme has a Professional Advisory Board as a means to keep the ILOs connected to the requirements of the professional field.

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 panel finds that the English-taught bachelor's programme CS (180 EC) has a well-organized curriculum with clearly defined learning lines. The curriculum is well-aligned with the ILOs. The programme follows an 8-8-4 calendar. Students follow two (6 EC) courses in an 8-week period; the 4-week periods are typically used for one (6 EC) course, which can be a project. The curriculum of the first year consists entirely of mandatory courses. The second year offers three constrained choices in periods 3, 5, and 6. The third year consists of a minor (30 EC), followed by two compulsory courses, the bachelor project (15 EC) and the course Philosophy and Ethics (3 EC).

The panel appreciates the structure of the first year, in which foundational knowledge is delivered through a selection of mandatory courses that align very well with the expectations of a CS programme, with smart systems engineering giving a unique angle that is not common in other CS bachelor's programmes. The programme offers a comprehensive overview of computer science, reflecting its diverse aspects. When the students start at the beginning of their first year, they may not all be at the same level, since they come from different environments and/or educational programmes. At the end of the first year, the goal is to have levelled out all these differences. The second year delves deeper into advanced topics, introducing constrained choices to allow students to explore areas aligned with their interests. This flexibility encourages personal growth while maintaining adherence to ACM guidelines, ensuring that all students acquire essential competencies. The curriculum balances core courses with electives, preparing students for specialization and interdisciplinary exploration. The third year emphasizes advanced coursework, the minor programme, and the final bachelor's project (thesis). This phase allows students to refine their expertise, synthesize knowledge from previous years, and contribute to research or real-world problem-solving. The bachelor's project, with which students finish their studies, is an opportunity to showcase their ability to independently apply theoretical and practical skills.

The bachelor's project can be of a purely theoretical nature or can be more applied, involving, for instance, a software implementation. Regardless of the nature of the project, it must meet VU's scientific standards. Students have to establish the exact nature and scope of the bachelor's project in agreement with a scientific supervisor. The previous panel (2018) recommended that students should be exposed more to research methodology skills throughout the programme. The current panel was informed that the follow-up of the recommendation remains a work in progress, but that students are exposed to research methodology throughout the bachelor. However, not all students are able to recognize these curriculum components,

leading to (sustained) student complaints on the perceived preparation for the bachelor's project. The panel therefore recommends the programme to expose all students more explicitly to research skills in the mandatory part of the programme, further strengthening the research methodology learning line, including topics such as academic writing which is currently only offered as an elective.

With regard to the curriculum, the panel furthermore discussed with both students and staff the manner in which the programme deals with GenAI. Although the panel found that internal discussions are ongoing, it suggests that the programme could benefit from an explicit, comprehensive, reflection on incorporating GenAI into the programme. Cyber security is a second topic that deserves more attention in the curriculum. Furthermore, the panel discussed the way in which the programme addresses ethical and societal aspects in the curriculum. It was informed that ethics are touched upon in each course, at the discretion of individual lecturers. The current third-year mandatory course Philosophy and Ethics (3 EC) is fully dedicated to ethics; the panel discussed its content and found it quite theoretical and generic in nature. The panel suggests that a more explicit application of ethics to computer science to include (for instance) legal and privacy matters, would be useful and beneficial to CS students as well as increased attention for ethics throughout the programme.

The panel considered the dual focus of the programme and discussed the way in which students are prepared for a professional career, as the curriculum does not include a mandatory internship. This places non-EU students at a disadvantage, as they are permitted to undertake internships only when these are formally integrated into the programme. The panel was informed that the PAB has advised the programme management to encourage more students to undertake an internship as part of their graduation project. In response, the programme has invested resources in establishing and expanding the Thesis Fair, providing students with more opportunities to find relevant projects for their bachelor's project. While the panel values these efforts, it suggests the programme offers industrial internships as an optional part to the programme, as this is a way to highlight its dual focus and to (more) convincingly address the ILO that states that students must be able to demonstrate analytical and problem-solving skills and work in multidisciplinary teams.

A variety in (activating) working methods and blended learning strategies are used in the courses that support the dual approach and engage the students. The panel appreciates that the programme allows students to participate in group projects that encourage collaboration and critical thinking.

Language of instruction

The panel agrees that offering an English-language programme is a strategic necessity that aligns with regional inclusivity, the global nature of the field, labour market demands, and the international standing of VU Amsterdam. Firstly, offering courses in English ensures inclusivity and accessibility, allowing students from various linguistic backgrounds to participate fully in the academic community and later on in the labour market. It also ensures that international staff, which currently comprises more than 50% of all scientific staff at the department, can fully contribute to education and not just to research. Secondly, English is the predominant language for technical documentation, research publications, and global collaboration. Proficiency in English enables students to engage with cutting-edge research, participate in international conferences, and collaborate with peers and experts worldwide, thereby enhancing their educational experience and professional readiness. Thirdly, the labour market demands graduates who are fluent in English, as it is the lingua franca of the tech industry. Many multinational companies and innovative start-ups operating in the Netherlands and beyond use English as their primary language of communication. Lastly, the international positioning of Dutch universities (and VU Amsterdam in particular) as leading institutions in computer science is significantly bolstered by offering programmes in English. This practice not only attracts top-tier faculty and researchers from around the world but also fosters global partnerships

and collaborations. Maintaining English as the medium of instruction helps Dutch universities to remain competitive on the international stage, contributing to their reputation as centres of excellence in education and research.

Intake

The panel finds that the current admission requirements, that are laid down in the Teaching and Examination Regulations, are reasonable. Applicants are directly admissible with a VWO-diploma (or equivalent). The requirements furthermore demand that they show sufficient knowledge of Mathematics B (at Dutch pre-university education level) and English language proficiency. In recent years, student enrolment has fluctuated significantly, leading to issues in scalability. Before the introduction of a *numerus fixus* (2023), the number of students increased rapidly, reaching 543 in 2022. After the introduction of the *numerus fixus* the number of students has decreased to 169 in 2024. The *numerus fixus* will be lifted from September 2026 onwards, leading to uncertainty on the enrolment numbers. A curriculum committee is currently working to ensure the programme is well-equipped to deal with potential scalability challenges once the *numerus fixus* is lifted. The PAB has also highlighted that it is necessary to limit the number of incoming students. This is particularly important in relation to the supervision of final individual projects, as this can be a bottleneck. The panel agrees with the programme management that adding or adjusting the current admissions criteria could be sensible to explore.

In addition, the bachelor CS attracts students from all over the world, leading to great diversity in educational and cultural backgrounds. Although a diverse student population is an asset, it can also pose a significant challenge for which the programme management needs adequate support. When attracting a large number of diverse students, their educational and cultural backgrounds, expectations of the programme and needs (and demands) for support may vary greatly. It is not only the responsibility of the programme management to deal with subsequent issues that arise, but of the faculty as a whole. The panel suggests that a broadly supported strategic vision needs to be in place (see Standard 1) as well as sufficient support for the programme management to address concerns widely ranging from academic challenges (e.g. regarding entry levels and prior knowledge) to social safety issues (e.g. stemming from cultural differences).

Guidance and feasibility

The panel finds the programme is feasible. Students receive support through various initiatives designed to enhance their academic and personal well-being. A dedicated team of mentors and tutors (teaching assistants/TAs) supports students in small groups, offering guidance tailored to individual needs. CS also has a team of four professionally certified Academic Advisors. At the start of each academic year, they invite all new students to an introductory meeting to explain their role and responsibilities, which include providing guidance on personal issues that may affect academic performance, assisting with study plans and granting exceptions where necessary, and ensuring students are informed about key administrative processes. If students require psychological support, they are referred to the university's student psychologists. The advisors also maintain close contact with the Social Safety Team to address any well-being concerns. Since 2022, first-year students can participate in a mentoring programme, where they are paired with a senior student who helps them navigate their academic journeys. Peer mentors assist with various aspects, such as course registration and study tips, adjusting to university life, and organizing educational, professional, and recreational activities to foster social cohesion. However, the panel found that not all students are aware of the existence of the mentoring programme; the programme should increase the efforts to bring this programme to the attention of the students. The panel appreciates the mix of academics, professionals, and peers who can support students through their journey.

The programme provides information about the available minors and master's programmes to ensure that students are aware of their options and to allow them to make informed study choices. The panel furthermore finds that the programme offers good support for students with special needs. The VU Amsterdam campus and buildings are equipped with various facilities to support students with functional impairments. Assistance is available on-site, with designated staff members present in all buildings to provide guidance. The panel is satisfied that the programme offers ample support and information to all students.

Teaching staff

The panel finds that the programme is taught by highly dedicated and competent staff who are strongly motivated. The majority of the staff who teach in the programme are research members of the sections Computer Systems and Security, Sustainable Digital Society and Theoretical Computer Science. The Department of Computer Science has undergone significant growth in staff size, partly in response to the rising number of students. A substantial cohort of new assistant professors has joined the teaching team. The panel finds that the staff shows an appropriate mix of seniority and of knowledge of different topics. The programme has pushed a co-teaching model with pairs of teachers, which seems an appropriate way to help junior teachers to integrate. The panel encourages to stimulate and support the co-teaching model to ensure that it keeps functioning in the way it was intended.

The majority of permanent staff has their University Teaching Qualification (UTQ/in Dutch: BKO) or is in the process of obtaining their UTQ. A limited number staff members has their STQ (Senior Teaching Qualification/in Dutch: SKO) or is in the process of obtaining an STQ. The panel finds that it would be appropriate for more staff members to obtain an STQ than is currently foreseen. In addition, the panel argues that the training for teaching assistants is limited and could be expanded. The panel is satisfied that all teaching staff must meet VU Amsterdam's language requirements and demonstrate C1-level English proficiency.

Managing the expansion takes effort, particularly given the diverse backgrounds of new faculty members. Aligning the diversity of the (newly recruited) teaching staff with the teaching philosophy and core values of VU Amsterdam has proven to be a complex yet critical task. The panel encourages all who are involved in the programme to make contributions to strengthening collaborations and further improving the teaching culture in the team. Also, systematic calibration between (the growing number of) teachers is crucial to ensure that courses remain aligned. Encouraging obtaining teaching qualifications, improving training for teaching assistants and co-teaching will help all teaching staff to deal with diversity in both the student and teaching bodies. In relation of diversity, the panel also suggests that the programme ensures that more senior female staff become visible to serve as role models for the female students.

Quality assurance

The Programme Committee (PC) of the Bachelor Computer Science consists of three students and three members of the teaching staff. The PC advises the management of the programme and the Faculty Board regarding policy decisions, content and structure of the curriculum, as well as individual courses and quality assurance. The panel found that students are heard and that they feel free to give feedback, for instance via informal conversations and formal student surveys. However, they are not always aware of what is being done with their feedback. Therefore, the panel recommends the programme to ensure that the feedback loop is explicitly closed by informing students of the measures taken in response to their feedback.

Considerations

The curriculum of the bachelor's programme CS enables student to achieve the intended learning outcomes of the programme. The curriculum is coherent and well-structured; the programme uses several activating teaching methods that support its dual focus.

The panel recommends that the programme explicitly and recognizably exposes all students to more research skills in the mandatory part of the programme, further strengthening the research methodology learning line, including topics such as academic writing. The programme is feasible and student support/guidance is up to standard.

The teaching staff is well-qualified, both in terms of academic activities and teaching qualifications. The panel appreciates the co-teaching method. The panel suggests that more senior female staff become visible to serve as role models for the female students.

The panel finds that the programme deploys ample initiatives to look after the quality and coherence of the programme. The programme is open to feedback and is willing to take measures to improve itself. The panel recommends that the feedback loop is explicitly closed by informing students of the measures taken in response to their feedback.

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

The Faculty of Science has compiled an Assessment Policy, which includes thorough instructions on how to set up reliable examinations and assessments. These instructions were utilized as input by the Examination Board (EB) of the faculty in developing its EB Rules and Guidelines. A detailed explanation of the specific assessment policy for the bachelor's programme CS is laid down in its Assessment Plan.

Course assessment

The panel finds that the programme has an appropriate system of assessment. The programme monitors and improves the quality of assessments via several means, such as the application of the four-eyes principle in designing assessment for each course, the compilation of assessment files (that include the assessment matrices and answer models with grading schemes), and the use of guidelines for formative and summative evaluations.

The various modes of assessment all contribute to the achievement of the intended learning outcomes. The assessment strategies are determined by the course's first examiner in consultation with the course's second examiner. Even though there is a substantial diversity in the types of assessment modes used in the different courses, most courses include group work and oral presentations. Each course includes at least one individual assignment that is done in a controlled setting, such as an oral or written exam at the university, to exclude the use of generative AI tools and ensure each student does some individual work for each course.

Assessment bachelor project

The panel has reviewed the assessments of fifteen bachelor projects and on the whole agrees with the grades given. Bachelor projects are always subject to two assessments, by the supervisor and a second assessor. The second assessors are found by the supervisor, student, or by the programme director. The only rule concerning the eligibility of the second assessor is that they have no involvement in the bachelor project process and do not have a hierarchical relation with the supervisor. The panel considers this to be on the minimal side and recommends that the programme strengthen the independence requirements of second examiners. The panel is satisfied that the assessment form of the bachelor project is based on a rubric, but does suggest it needs updating as the curriculum is developing. An important point of attention is that examiners do not have the opportunity to provide a detailed qualitative substantiation of grades given on the assessment form. A (personal) substantiation of the grade, the panel argues, is important to always include as it enhances transparency and could serve as feedback for students and other stakeholders, such as the Examination Board. As the staff has grown significantly, the panel additionally recommends that calibration sessions are facilitated and systematically approached, to ensure consistency in grading.

The panel discussed the 20% cum laude rate, which it deems a rather large percentage. A qualitative description of the grades for the bachelor projects could (in part) help to understand the reasons for this outcome. The panel suggests that a discussion on the cum laude rules is in place, perhaps leading to adaptations.

Examination Board

The panel spoke with a strong and pro-active Examination Board (EB) that fulfils its legal duties. An overarching Examination Board IS/NSM of the Faculty of Science safeguards the quality of assessment and examinations within all educational programmes in the domains Information Sciences (IS) and Natural Sciences and Mathematics (NSM). The subcommittee for Information Sciences, responsible for the programmes offered at the Computer Science Department, consists of four senior staff members with distinct roles and responsibilities. One member oversees approval of programmes and exemptions. Two members manage all matters around fraud and assessment policy, while the fourth member has more of an advisory role in problematic cases.

The EB has established an Assessment Committee to oversee the implementation of the examination guidelines. All the EB's subcommittees are represented in the Assessment Committee. Every year, a sample of courses are selected for review. Pass rates (courses with a pass rate of less than 50% are always reviewed), information from previous years, student course evaluations, requests from the Programme Director or Programme Committee, and other signals are used to choose the samples of courses. Each course is reviewed every three to four years. A representative sample of students' theses is selected for review as well, making sure that a variety of grades are part of the sample. The outcomes of the EB's reviews are reported to the Programme Director who is responsible for acting in the case of issues. The EB has not flagged any pressing issues recently regarding the assessment and examination of the courses or the theses of the bachelor's programme CS.

Considerations

The programme has a reliable, valid, and transparent system of assessment in place. There are adequate procedures for design and quality assurance of exams and assignments.

With regards to the bachelor projects, the panel finds that the rubric deserves an update and the requirements regarding the independence of the second assessor need strengthening. The panel encourages the programme to ensure that motivations are always given to justify and substantiate grades given.

The panel is satisfied that the programme has a strong and pro-active Examination Board that fulfils its legal duties.

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

Prior to the site visit, the panel studied a selection of 15 bachelor projects. The panel concludes that the overall quality of the reviewed theses is good to excellent: they demonstrate that graduates generally attain the intended learning outcomes at the expected level. Students exhibit a solid grounding in core computer science concepts and mathematical reasoning and are able to apply this knowledge effectively in structured problem-solving contexts.

Alumni

The panel is satisfied that CS graduates have no problems finding a job in their preferred field. The most recent alumni survey (2025) shows that the prospects for graduates of the bachelor's programme CS are very good: 85.4 % of the alumni found a job in less than three months after their graduation, while the remaining 14.6% took between three and six months. It is important to note that some respondents pursued a master's programme upon completing their bachelor's degree. As such, the data presented partly reflect their employability following their master's programme. The results of the survey show that 56.1% of alumni work in the private sector, whereas 9.8% work in the public sector. Approximately 9.8% of alumni work in education and/or research and that about 2.9% are entrepreneurs. The majority of alumni is currently active in the Netherlands (82.9%); the remaining 17.1 % is employed in other (European) countries.

Furthermore, the panel found that the PAB is positively impressed with the way the programme prepares students for the labour market: it teaches students the skills and competences that are needed to successfully fulfil the current needs of the industry.

The panel appreciates the efforts made to create a solid alumni network. To strengthen connections between current students and alumni, the Department of Computer Science has been hosting Alumni-in-the-Spotlight meetings since 2019, which seems to be a simple yet effective way to keep the links alive. The informal gatherings feature a presentation by an alumnus/a from one of the department's programmes, highlighting their career journey, followed by a networking session. Each meeting involves at least one staff member and is open to all alumni, students, and faculty. The primary goal is to foster a dynamic exchange between students, professionals, and academic staff. Over the years, several alumni from the bachelor's programme Computer Science have participated as speakers, sharing their insights and experiences.

Considerations

The bachelor projects show that students realize the intended learning outcomes of the programme. Alumni either enter the job market or progress to a (specialized) master's programme and subsequently find a job in the field of their choice.

Conclusion

The panel concludes that the programme meets standard 4.

General conclusion

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

Recommendations

1. Update the ILOs and curriculum in view of developments around generative AI.
2. Finalize the strategic vision to serve as a guiding document in the further development of the programme.
3. Expose all students to more research skills in the mandatory part of the programme, further strengthening the research methodology learning line, including topics such as academic writing.
4. Ensure that the feedback loop is explicitly closed by informing students of the measures taken in response to their feedback.
5. Update the rubric (assessment form) for the bachelor's project and ensure that examiners provide a detailed qualitative substantiation of grades given.
6. Systematically facilitate and organize calibration sessions for assessors of bachelor's projects.
7. Strengthen the independence requirements for second assessors of the bachelor's project.

Appendix 1. Intended learning outcomes

1. Have thorough theoretical and practical knowledge of computer science which covers the areas of formal methods, algorithms, logic and mathematics, programming, computer systems, and software design (Knowledge & understanding);
2. Have become acquainted with research and development in the field of computer science at an academic level and with the associated scientific skills (Knowledge & understanding);
3. Have acquired practical skills that are relevant to the field of computer science and be capable of applying them in specific and common professional situations. These include using tools to model, assemble, deploy, and evaluate computer systems (Applying knowledge & understanding);
4. Be aware of the role of computer science in society, including the related ethical issues, as well as the development of the field of computer science and the nature of this academic discipline, and be able to use this awareness when reflecting on his or her own activities and thought processes (Making judgements);
5. Be familiar with empirical aspects of computer science, especially the evaluation of various types of systems, both in qualitative and quantitative terms (Knowledge & Understanding);
6. Have demonstrated a clear analytical and problem-solving ability and be capable of taking a project-based approach to solve challenging problems, including participation in a multidisciplinary team, maintaining an open attitude about the exploratory development of complex systems (Making judgements);
7. Be able to communicate professionally and at an academic level, including the formulation of objectives, the selection of appropriate resources (technology), and the definition of projects and research plans (Communication);
8. Be capable of presenting results clearly and succinctly, both orally and in writing (i.e., reports for professional use or of an academic nature) (Learning Skills).

Appendix 2. Programme curriculum

	period 1	period 2	period 3	period 4	period 5	period 6
YEAR 1	Computer Programming XB_40011 (6EC)	Data Structures & Algorithms I XB_0151 (6EC)	Web Technology X_400488 (6EC)	Computer Organization XB_40009 (6EC)	Computer Networks X_400487 (6EC)	Systems Programming Project XB_0123 (6EC)
	Logic and Sets for CS XB_0086 (6EC)	Smart Systems Engineering XB_0154 (6EC)		Requirements Engineering XB_0032 (6EC)	Discrete Mathematics & Calculus XB_0122 (6EC)	
YEAR 2	Object-Oriented and Functional Programming XB_0019 (6EC)	Operating Systems X_405067 (6EC)	History of Science for CS XB_0076 (3EC)	Software Design XB_40007 (6EC)	Databases X_401008 (6EC)	Human-Computer Interaction XB_400432 (6EC)
	Statistical Methods X_401020 (6EC)	Data Structures and Algorithms II XB_0152 (6EC)	Academic Writing for CS XB_0075 (3EC)	Linear Algebra X_400649 (6EC)	Information Management for CS XB_0087 (6EC)	Software Engineering Processes XB_0089 (6EC)
			Professional Development XB_0101 (3EC)		Logic and Modelling X_401015 (6EC)	Security & Safety Engineering XB_0088 (6EC)
YEAR 3	Minor	Minor	Minor	Machine Learning X_400154 (6EC)	Bachelor Project XB_40001 (15 ECs)	
	Minor	Minor		Automata and Complexity X_401049 (6EC)	Philosophy & Ethics X_400333 (3EC)	

Appendix 3. Programme of the site visit

Day 1: 24 November 2025

09.00-09.15 Welcome
09.15-09.30 Panel Preparation
09.30-10.30 Interview management (faculty + programmes)
10.30-10.45 Short break
10.45-11.45 Interview MSc CS students
11.45-13.00 Break + Lunch
13.00-14.00 Interview MSc CSec students
14.00-14.15 Short break
14.15-15.15 Interview MSc CS & CSec teaching staff
15.15-16.15 Internal panel meeting (internal panel meeting, preliminary conclusions masters)
16.15-17.15 Interview alumni and Professional Advisory Board

Day 2: 25 November 2025

09.00-09.30 Arrival panel and preparation
09.30-10.30 Interview BSc students
10.30-10.45 Short break
10.45-11.45 Interview BSc teaching staff
11.45-12.30 Interview Board of Examiners
12.30-14.30 Internal panel session including lunch (drawing up preliminary findings bachelor)
14.30-15.00 Concluding session management
15.00-15.15 Short break
15.15-15.45 Parallel development sessions to recap and exchange thoughts on findings during previous sessions. 1 session for B CS and 1 session for M CS & CSec (invite at least students plus management)
15.45-16.15 Internal panel session (preliminary findings, bachelor and masters)
16.15-17.15 Oral feedback panel NVAO standards + development questions (+ drinks)

Appendix 4. Materials

Prior to the site visit, the panel studied 15 bachelor's projects. Information on these is available from Academion upon request.

The panel also studied other materials, which included:

- Self-evaluation report
- Accreditation report 2018

Appendices to the self-evaluation report:

1. BETA organogram
2. Annual report programme committee 2023-2024
3. Professional Advisory Board (PAB) meeting notes July 2024
4. ACM framework 2023, 4A. ACM framework 2013
5. Exit qualifications Bachelor Computer Science 2025-2026
6. Schematic overview curriculum 2025-2026
7. Study guide
8. On the need for English
9. Vision on Internationalization
10. Assessment plan
11. Assessment programme
12. Overview of enrolled students (2024-2025)
13. Factsheet
14. Staff overview
15. Nationale Studenten Enquete (NSE) results 2025
16. Assessment Policy the Faculty of Science at VU Amsterdam
17. Examination Board Rules and Guidelines
18. Teaching and Examination Regulations (TER) B CS 2024-2025
19. Assessment Rubric Bachelor project
20. Bachelor Project Course Manual
21. An overview of the students who successfully completed their Bachelor Project in 2022 & 2023 (2024 will be added in September)
22. Annual report Examination board
23. Alumni questionnaire BSc Computer Science (answers)
24. Alumni questionnaire BSc Computer Science (questions)

Course materials

1. Object-Oriented and Functional programming 2022-2023, Study guide 2024-2025, Canvas 2024-2025
2. Computer Organization 2023-2024, Study guide Computer Organization, 2024- 2025, Canvas Computer Organization 2024-2025
3. Linear Algebra 2023-2024, Study guide Linear Algebra 2024-2025, Canvas Linear Algebra 2024-2025
4. Networks and Graphs 2024-2025 (course is renamed in 2025 to Data Structures and Algorithms II), Study guide Networks and Graphs 2024-2025, Canvas Networks and Graphs 2024-2025 Study guide Software Design 2024-2025
5. Software Design 2023-2024, Canvas Software Design 2024-2025, Study guide 2024-2025
6. Pervasive Computing 2024-2025 (course is renamed in 2025 to Smart Systems Engineering), Study guide Pervasive Computing 2024-2025, Canvas Pervasive Computing 2024-2025

7. Philosophy and Ethics 2023-2024, Study guide 2024-2025, Canvas Philosophy and Ethics 2024-2025