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M Computer Science (joint degree)

Vrije Universiteit Amsterdam

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Project code P2409

Contents

Summary 4
Score table 5
Introduction 6
Procedure 6
Panel 7
Information on the programme 8
Description of the assessment 9
Organization 9
Recommendations previous panel 9
Standard 1. Intended learning outcomes 10
Standard 2. Teaching-learning environment 11
Standard 3. Student assessment 16
Standard 4. Achieved learning outcomes 18
General conclusion 18
Recommendations 19
Appendix 1. Intended learning outcomes 20
Appendix 2. Programme curriculum 22
Appendix 3. Programme of the site visit 23
Appendix 4. Materials 24

Summary

Standard 1. Intended learning outcomes

The ambitions of the master's programme Computer Science (CS) are fitting for an academic master's programme in this field. The panel appreciates its alignment with international frameworks and recent development in the field (as reflected in the four main specializations). 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. The panel makes recommendations on updating the ILOs in view of generative AI developments and regarding some generic formulations.

The panel is satisfied that the programme has an active 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 master's programme CS enables student to achieve the intended learning outcomes of the programme. The curriculum is coherent and well-structured. The collaboration between VU Amsterdam and the University of Amsterdam makes for a rich offering for students. However, managing a joint degree programme poses challenges including practical issues related to scheduling and registering. Other challenges concern bringing together two teaching cultures and aligning courses and teachers from different institutions. The panel compliments both VU Amsterdam and the UvA on successfully managing the joint degree so far, and encourages the programme to make their practices on how the challenges are dealt with more visible.

The programme is feasible and student support/guidance is available. However, the panel finds that the planning and follow-up of study plans and the thesis process could be tightened in an effort to improve on study duration. In addition, information for students could be improved with regards to study load and overall expectations of a course. The teaching staff from both VU Amsterdam and the UvA is well-qualified, both in terms of academic activities and teaching qualifications. The panel does suggest 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 master's projects, the panel finds that requirements regarding the independence of the second assessor need strengthening. The panel encourages the programme to ensure that significant 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 master's theses show that students realize the intended learning outcomes of the programme. Alumni find a job in the field of their choice.

Score table

The panel assesses the programme as follows:

M 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

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 master's programme Computer Science of the Vrije Universiteit Amsterdam (hereafter: VU Amsterdam) and the University of Amsterdam (hereafter: UvA) 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). It also followed the 'Protocol Joint Degree 2021'.

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 Vrije Universiteit Amsterdam was chosen as the site visit location because the VU is the coordinating institution of the joint degree. In addition, the VU and UvA site visits were scheduled back-to-back between 24-27 November 2025, with overlapping panels (4 out of 5 panel members), so that the panel could include impressions from both locations in its evaluation of the joint degree. 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 programmes provided the coordinator with a list of graduates over the period 2024-2025. In consultation with the coordinator, the panel chair selected 15 theses. They took the diversity of final grades and examiners into account, as well as the four various specializations and (former) tracks: Computer Systems and Infrastructure (1), Big Data Engineering (4), Systems for large-Scale Applications (2), Software Engineering & Green IT (3), Software Engineering & Green Deal (1), Computer Systems Security (1) Parallel

Computing Systems (1), Foundations of Computing and Concurrency (1) and Internet & Web Technology (1). This selection reflected the number of graduates in each particular track proportionally.

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 self-evaluation report and additional materials (see appendix 4).

The panel members studied the information and sent their findings to the secretary. The secretary collected the panel's questions and remarks in a document and shared this with the panel members. In a preliminary meeting, the panel discussed the initial findings on the self-evaluation report 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

During the site visit, the panel interviewed various programme representatives (see appendix 3). Care was taken to ensure that staff from both UvA and VU was present during the sessions. 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 M Computer Science at the VU and UvA 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 (VU)
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
Name of the institution:	University of Amsterdam (UvA)
Address:	Nieuwe Achtergracht 166, 1018 WS, Amsterdam
Website:	www.uva.nl
BRIN-number:	21PK
Status of the institution:	Publicly funded institution
Result institutional quality assurance assessment:	Positive
Programme name:	Computer Science
ISAT number:	65014
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:	Big Data Engineering (BDE) Computer Systems and Infrastructure (CSI) Foundations of Computing and Concurrency (FCC) Software Engineering and Green IT (SEG)
Particulars:	Joint Degree UvA & VU
Locations:	UvA Science Park and VU Campus
Mode of study:	Full time
Assessment group:	Informatica groep 3
Awarded degree:	MSc
Submission date NVAO:	1 May 2026

Description of the assessment

Organization

The master's programme Computer Science (CS) is a joint degree offered by the two research universities in Amsterdam: Vrije Universiteit Amsterdam (VU Amsterdam, lead institution) and the University of Amsterdam (UvA). The master's programme CS is coordinated by the Computer Science Department of the Faculty of Science of VU Amsterdam. The faculty is managed by the Faculty Board, consisting of the Dean, the Vice Dean for Education, and the Director of Operations.

The collaboration in the joint degree is formalized in a cooperation agreement between both universities, and operationalized in a handbook for use by the programme organization. Both the UvA and VU Amsterdam contribute to the joint degree programme: teaching staff of both institutions is actively involved in delivering courses and supervising thesis projects. Organizationally, the master CS is coordinated by the VU and is embedded in the organizational structure and quality assurance of the VU's Faculty of Science.

The master is headed by a Programme Director who plays a vital role in the organization and quality assurance cycles of the programme, together with the Scientific Coordinator of the UvA. The Programme Director receives advice regarding the content of the specializations from the relevant Specialization Coordinators. Currently, all Specialization Coordinators are VU employees, with the exception of the Scientific Coordinator of the UvA who coordinates the specialization Big Data Engineering (BDE).

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. At the UvA the programme is also supported by a Programme Coordinator.

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). Both bodies include representatives from the UvA and VU Amsterdam and are part of the VU Amsterdam Faculty of Science's organizational structure.

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.

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

Computer science has become essential to 21st century society as well as its economy. Virtually every human being is connected to the information available on the internet. Likewise, many items of daily life have become digitized, ranging from the internet of things, via household appliances, cars, up to the gigantic cloud datacentres running today's AI applications. Graduates of the master's programme Computer Science (CS) contribute to society with their in-depth knowledge and understanding of all aspects of information technology (IT), its opportunities and limitations, as well as the impact of IT on society, economy, and the global ecosystems.

The programme CS aims to provide students with the knowledge, experience, and insights which are needed to autonomously work as a computer scientist and the panel finds that it is well-aligned with international frameworks including the ACM/IEEE-CS/AAAI Computer Science Curricula. On the one hand, it offers students a solid basis for a career in the industry at an academic level, while on the other it prepares them for possible further education in Ph.D. programmes, for those interested in academic research. The programme provides students with an understanding of the position of computer science in a broader societal and scientific context. It aims to educate students in the broad domain of computer science, while allowing them to specialize in a direction of their choice, related to (1) Big Data Engineering (BDE), (2) Foundations of Computing and Concurrency (FCC), (3) Computer Systems and Infrastructure (CSI), or (4) Software Engineering and Green IT (SEG). The panel appreciates that, besides providing a broad coverage of the Computer Science domain, it is the programme's ambition to steer students towards the frontiers of design and application, as well as major research issues in their chosen specialization. The panel finds that the specializations tie in with recent developments in the field of CS and appreciates that they are supported by strong research groups.

Intended learning outcomes

The panel found that the ambitions of the programme have been translated into a clear and balanced set of thirteen intended learning outcomes (ILOs) (see Appendix 1). Each of the four specialisations has its own set of ILOs, in which specialist knowledge and skills are described. The specialization-specific ILOs are aligned with the set of courses offered, such that students will achieve them, independent of the individually chosen courses within the constrained choice package (see Standard 2). 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 NLQF level 7 (master's level). A recommendation the panel makes is that the programme updates the ILOs in view of generative AI developments, as these are not yet explicitly addressed. In addition, the panel suggests that the programme – when next updating the ILOs – reconsiders generic formulations. For example, ILO 3 refers to acquiring specialist knowledge in 'reasonable' time, which seems vague and difficult to assess.

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), which has an advisory role for the bachelor's programme Computer Science, as well as for the master's programmes Computer Science and Computer Security.

Considerations

The ambitions of the master's programme CS are fitting for an academic master's programme in this field. The panel appreciates its alignment with international frameworks and recent development in the field (as reflected in the four main specializations). 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. The panel makes recommendations on updating the ILOs in view of generative AI developments and regarding some generic formulations.

The panel is satisfied that the programme has an active 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 master's CS (120 EC) has a well-organized curriculum that is clearly structured around specializations (tracks) and learning lines. It consists of seven constrained choice courses related to the four tracks (see below), a compulsory course on research methods, four free choice courses, and a final master's project. This structure has been set up to ensure a student's programme covers the breadth of the CS domain, along with specialization in one particular area.

As computer science is a highly dynamic field, with technological (and theoretical) developments succeeding each other at a rapid pace, the panel appreciates that the programme is based on topical specializations. Students select their specialization upon enrolment to the programme. From the chosen specialization, students take (at least) four courses (constrained choice). From the three other specializations, students choose one course each. In addition, they choose one course each from the constrained choices on mathematics, on computer security, and on societal perspectives; this aims to ensure knowledge and understanding in related domains, and in the societal impact of computer science applications. At the end of the first year, students follow the mandatory course on research methods that prepares them for conducting their final master's projects. The set of constrained choices together ensure broad coverage of the computer science domain. The panel appreciates the clear tracks, which are strongly connected to research.

The master's project (thesis) requires students use all the knowledge acquired during the studies to perform a design task or to contribute to solving a scientific problem in the computer science field. The project can take place either inside the Department of Computer Science of VU Amsterdam or the Informatics Institute of the University of Amsterdam or as an internship in a company. In all cases, a detailed project proposal must be written and approved in advance by a staff member, who in this way agrees to act as the project's main supervisor. The proposal must include the problem statement, the research question(s), a short description of the proposed method, and a timeline specifying the planned schedule and the frequency of meetings with the supervisor. In most cases, the master's project is performed as an individual project; in exceptional and well-argued cases, students may execute projects in small groups.

As the programme wishes to prepare students for (leading) positions in industry, the panel has discussed the topic of internships specifically, as they are not compulsory anywhere in the programme. Students are excited about internships, as they offer a path towards the labour market and allow them to practice professional CS skills. However, the programme does not incorporate an internship or offer (structural) support for them anymore. The reason being that guiding and supporting internships poses organizational challenges. Several students informed the panel that they organized their own (extra-curricular) internship to not miss out on the opportunities it offers them. The panel finds that internships offer very valuable experiences and allow for a strengthening in relations with industry (for both the students and the programme), which the PAB agrees with. Therefore, the panel encourages the programme reconsider on how to make internships work in terms of workload for staff and experience for all students, including non-EU students, as the latter are unable to organize their own internship without encountering visa-related problems.

The panel finds that the curriculum design allows the programme to educate students in a way that is both broad and close to the technological forefront of the CS domain. Students informed the panel that they enjoy the flexibility that the programme offers. It allows them to tailor their programme to individual preferences. The panel appreciates the dual focus on fundamentals (via a mandatory part of the curriculum) and customization (via the specialization). However, the rationale for having to choose a course from each of the three other specializations (as a contributing factor to the 'breadth' of the programme), remains unclear to the panel and deserves elaboration. Based on the student interview, the panel concludes that this set-up is not necessarily appreciated by the students. In addition, the panel suggests that the programme could benefit from an explicit reflection on incorporating GenAI into the programme, in particular in relation to the master's project. Currently, the manner in which issues around GenAI are addressed differ per lecturer. Not only the use of GenAI by students should be topic of this reflection, but also the manner in which GenAI will change computer science as a discipline in the future. Lastly, the panel discussed the manner in which ethics and societal aspects are addressed in the programme and found that this is quite limited. Students informed the panel that the attention paid to it is mostly lecturer-specific. The panel finds that the programme should be more proactive in addressing these aspects and therefore recommends that ethics and societal aspects are explicitly considered, especially in relation to the thesis (master's project).

The panel subscribes to the programme's premise that different topical fields and skills require, to some degree, tailored teaching methods. Within each course, teachers are given the freedom to translate the content into suitable forms of tuition and examination. A common denominator, however, is to offer hands-on experience wherever possible, in the form of practical lab exercises and assignments.

Joint degree

The panel finds that the collaboration between VU Amsterdam and the University of Amsterdam makes for a rich offering for students. It allows the programme to remain up-to-date in a fast-moving field and to provide students with ample opportunities to prepare for their preferred, professional futures. The institutions work well together: the collaboration in the joint degree is formalized in a cooperation agreement between both universities, and operationalized in a handbook for use by the programme organization. Both the UvA and VU Amsterdam contribute to the joint degree programme: teaching staff of both institutions is actively involved in delivering courses and supervising thesis projects. Students informed the panel that they enjoy the benefits of the joint degree, but they do run into practical challenges as teaching is distributed over two campuses. These challenges concern administrative issues such as scheduling and registering. Both institutions are aware of these challenges, but have not been able to fully resolve them yet. The panel strongly encourages the programme and (the management of) both faculties involved to ensure that these practical matters are resolved.

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 and the University of 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.

All teaching staff must meet VU Amsterdam's language requirements and demonstrate C1-level English proficiency. The Department of Computer Science monitors compliance in the staff overview.

Guidance
Students receive support through various initiatives designed to enhance their academic and personal well-being. The specialization coordinators act as expert advisors for assembling the individual study plans of the students within their specialization. They provide the newly-arrived students with templates of possible course combinations that students can adapt to their personal interests. Also later in their studies, students can get advice about meaningful course combinations from their specialization coordinators.

Furthermore, 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 panel appreciates the mix of academics, professionals, and peers who can support students through their journeys.

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.

Intake and feasibility

The panel finds that the programme adheres to clear and sensible admission criteria, as described in the Teaching and Examination Regulations (TER). Applicants are expected to possess a bachelor's degree from a research university in the field of computer science, or a closely related field. Applicants must have followed at least 120 EC of computer science topics (a precise list included is in the TER) and prove to have sufficient English language proficiency. All graduates from a Bachelor's programme in computer science (precise list included in the TER) from a research university in the Netherlands are admitted directly. Students with bachelor's diplomas from other countries are evaluated individually for meeting the abovementioned criterion of at least 120 EC computer science topics. Students from vocational programmes (such as a Dutch HBO) can be admitted via a premaster programme. Also, students from research universities with at least 90 EC of computer science topics can be admitted via a premaster programme. Student admission is being handled by the admission board, consisting of the programme director, the four track coordinators, and two members for premaster admissions. The student population in the master's programme CS is highly international and represents a diversity in educational and cultural backgrounds. With some annual variation, the influx is roughly around 180 students per year.

The programme reports on their ambition to guide students through the programme at a faster pace. At the time of the site visit, there is positive, upward trend in completion rates leading to 34.3% of students graduating after 2 years, and 40.6% graduating after three years. The programme informed the panel that improvement of these rates has the explicit attention of programme management. The search for reasons for the current study progress pace has been only partially successful so far. One possibility might be that students cannot always take the courses they wish due to scheduling conflicts (both in teaching periods within the academic year and within the weekly schedules), making them opt for extra study time over study speed. Another potential reason is that many students take on side jobs, leading to some study delay. The panel discussed students' progress during the site visit with various stakeholders and based on these interviews, the panel suggests that students might benefit from improved (tighter) planning and follow-up on study plans and a tightened thesis process to reduce study delays, both of which would require extra efforts from specialization coordinators and thesis supervisors. The panel additionally suggests that the design of model tracks for students could allow for a smoother progress through the programme. Lastly, the interview with the students revealed that it can be difficult for them to ascertain what some courses entail exactly. This sometimes leads to a heavier study load than expected. The panel therefore suggests that the information for students in the study guide and/or the manner in which the study plans are made could benefit from reconsideration.

Teaching staff

The teaching staff comprises lecturers employed by the research institutes of VU Amsterdam and the UvA. They are active researchers involved in top international research, who therefore can deliver research-driven education that is up-to-date with current scientific developments. The teaching staff at both universities teach courses, supervise thesis projects, and contribute to the curriculum. At VU Amsterdam 42 teaching staff members (7,3 fte) contribute to the programme; the UvA contributes 27 teaching staff members (2,6 fte) to the programme.

The panel finds that the programme is taught by highly dedicated and competent staff who are strongly motivated. The teaching team 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 majority of permanent VU Amsterdam and UvA teaching 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. 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.

Managing the staff expansion takes effort, particularly aligning the diversity of the (newly recruited) teaching staff with the teaching philosophy has proven to be a complex yet critical task. Also, systematic calibration between (the growing number of) teachers is crucial to ensure that courses remain aligned. The panel emphasizes that strengthening collaborations and further improving the teaching culture in the team is a joint responsibility of all involved in the programme. This is especially important as teachers from two universities work alongside each other in this programme. There is currently limited participation in the joint teaching staff meetings, leading the panel to question how the cultures and teaching practices of the two facilities converge (if at all). With regards to creating alignment between teachers and contents of courses, the panel finds that the programme could make their working practices more visible.

Quality assurance
The Programme Committee (PC) of the master's programme Computer Science consists of three students and three members of the teaching staff. The students are enrolled at VU Amsterdam and the UvA. All three teaching staff members are VU Amsterdam staff; a UvA representative attends meetings as a guest member. 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 master's programme CS enables student to achieve the intended learning outcomes of the programme. The curriculum is coherent and well-structured. The collaboration between VU Amsterdam and the University of Amsterdam makes for a rich offering for students. However, managing a joint degree programme poses challenges including practical issues related to scheduling and registering. Other challenges concern bringing together two teaching cultures and aligning courses and teachers from different institutions. The panel compliments both VU Amsterdam and the UvA on successfully managing the joint degree so far, and encourages the programme to make their practices on how the challenges are dealt with more visible.

The programme is feasible and student support/guidance is available. However, the panel finds that the planning and follow-up of study plans and the thesis process could be tightened in an effort to improve on study duration. In addition, information for students could be improved with regards to study load and overall expectations of a course.

The teaching staff from both VU Amsterdam and the UvA is well-qualified, both in terms of academic activities and teaching qualifications. The panel does suggest 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 master'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.

Master thesis

The panel is positive about the assessment of the master's theses and agreed with the grades given. The theses are always subject to two assessments, by the supervisor and a second assessor. The second assessors are found by the supervisor. The only rule concerning the eligibility of the second assessor is that they have no involvement in the master's project process and do not have a hierarchical relation with the supervisor. The panel considers this to be quite minimal guidelines and recommends that the programme strengthens the independence requirements of second examiners. The panel is satisfied that the assessment form of the master project is based on a rubric, but does suggest it needs updating as the curriculum is developing. An important point of attention is that some examiners provide only a minimal qualitative substantiation of grades given on the assessment form. A more elaborate substation 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.

Examination Board
The panel spoke with a strong and pro-active Examination Board (EB) that fulfils its legal duties. The 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 at the VU, consists of four senior staff members with distinct roles and responsibilities. One member is in charge of approval of programmes and giving exemptions. Two members manage all matters around fraud and assessment policy, while the fourth member has more of an advisory role in problematic cases. Three members are from the VU and one member is from the UvA.

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 issues recently regarding the assessment and examination of the courses or the theses of the master'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 master's projects, the panel finds that requirements regarding the independence of the second assessor need strengthening. The panel encourages the programme to ensure that significant 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 master's CS theses. The panel largely agrees with the grades given and concludes that the reviewed master's theses demonstrate students' ability to conduct independent research or advanced design work at the appropriate academic level. The theses show methodological rigor, solid analytical reasoning, engagement with the relevant literature, and well-supported conclusions. The panel notes that a substantial fraction of thesis leads to publications. Overall, the panel considers the quality of the final projects to be high and commensurate with a research-intensive academic master's programme.

Alumni

The panel is satisfied that CS masters ultimately find a job in their preferred field, relatively easily. The most recent alumni survey (2025) shows that the prospects for graduates of the master's programme CS are very good: 87.7% of the alumni found a job in less than three months after their graduation, while 10.6% took between three and six months. Further, 94.5% indicate that they are satisfied with their current work and career perspectives. In addition, the results of the questionnaire show that 62.3% of the alumni work in the private sector and 9,5% work in the public sector. Approximately 14.9% of the alumni work in education and/or research and about 10,8% are entrepreneurs. The remaining 2.5% works for non-profit organizations.

In general, 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 master's programme Computer Science have participated as speakers, sharing their insights and experiences.

Considerations

The master's theses show that students realize the intended learning outcomes of the programme. Alumni find a job in the field of their choice.

Conclusion

The panel concludes that the programme meets standard 4.

General conclusion

The panel's 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 in view of generative AI developments and regarding generic formulations.
2. Reflect on the impact of GenAI on the CS field and on incorporating GenAI into the programme (in particular in relation to the master's project).
3. Consider reintroducing internships that provide a meaningful experience for all students, including non-EU students, while ensuring a manageable workload for staff.
4. Ensure that ethics are explicitly considered, especially in relation to the thesis (master's project).
5. Ensure that the feedback loop is explicitly closed by informing students of the measures taken in response to their feedback.
6. Improve planning and follow-up on study plans and the thesis process to reduce study delays.
7. Update the master's project rubric and systematically facilitate and organize calibration sessions for assessors of master's projects.
8. Strengthen the independence requirements for second assessors (master's projects).
9. Make sure that examiners provide a more detailed qualitative substantiation of grades given for the master's project.

Appendix 1. Intended learning outcomes

A graduate of the **master's programme** in **Computer Science**:

1. possesses solid academic knowledge and insight in the field of computer science, including the required background knowledge from other academic disciplines, which builds upon and goes beyond the level of a Bachelor's degree (Knowledge & Understanding);
2. has knowledge, insight and skills of a specialist nature in at least one area of computer science (additional final attainment levels to be given for each specialization separately) (Knowledge & Understanding)
3. is able to acquire specialist knowledge, insights and skills in other areas of computer science within a reasonable period of time, and to keep his or her abilities up to date throughout his or her whole professional career (Learning Skills);
4. has acquired practical skills at Master level within the field of computer science (Applying Knowledge and Understanding);
5. is aware of the applications of computer science in general and of the chosen specialization in particular, and is able to apply their knowledge and skills to new or otherwise unknown problems (Applying Knowledge and Understanding);
6. is capable of designing a research or project plan on the basis of a realistic problem description in the field of computer science and can contribute to its progress with original solutions (Applying Knowledge and Understanding);
7. is able to carry out research independently, both individually and in small teams (Applying Knowledge and Understanding);
8. is able to consult and use the international professional literature in the field of computer science (Knowledge & Understanding);
9. is able to formulate, analyse and evaluate scientific results, and to use them to draw conclusions (Making Judgements);
10. is able to function in professional situations in an international context where scientific knowledge and skills in computer science are required (Learning Skills);
11. has developed a critical, scientific attitude and a societal perspective on information technology (Making Judgements);
12. is able to communicate with others at a professional level and can give clear oral and written presentations of the results of his/her work (Communication);
13. is thoroughly prepared for further education at doctorate level or for further postgraduate education as a professional computer scientist (Learning Skills).

A graduate of the **track/specialization Big Data Engineering** will have the following knowledge and understanding in the field of:
1) BDE-1. Developing efficient pipelines for data preparation and data mining;
2) BDE-2. Acquiring experience with algorithms and infrastructure for managing big data;
3) BDE-3. Designing solutions for advanced data analytics using big data platforms.

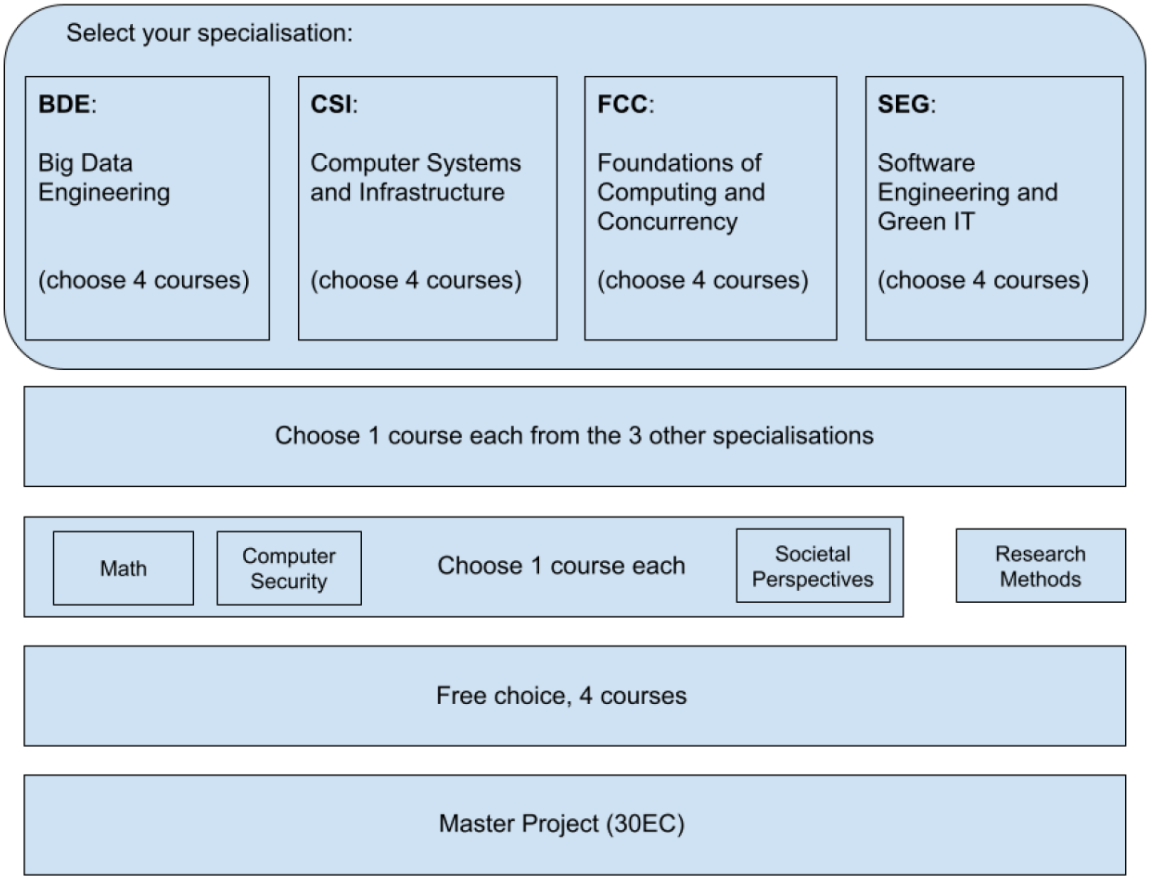
A graduate of the **track/specialization Computer Systems and Infrastructure** will have the following knowledge and understanding in the field of:
1) CSI-1. Designing modern computing and networking infrastructures for supporting resource-demanding, data-intensive applications;
2) CSI-2. Programming low-level systems-oriented software for emerging computing and networking hardware in the context of both cloud data centers and edge devices, with energy and security in mind;

3) CSI-3. Conducting experiments on modern computer systems and networks and being able to properly interpret data resulting from such experiments.

A graduate of the **track/specialization Foundations of Computing and Concurrency** will have the following knowledge and understanding in the field of:
1) FCC-1. Models of computation;
2) FCC-2. Models of concurrency;
3) FCC-3. Automated verification;

A graduate of the **track/specialization Software Engineering and Green IT** will have the following knowledge and understanding in the field of:
1) SEG-1. Design and development of complex software systems by applying current software engineering theories, models, and techniques;
2) SEG-2. Reconciling the possibly-conflicting objectives of a complex software system and finding acceptable compromises in terms of its cost, time, resources, organisational constraints, and societal impact;
3) SEG-3. Execution of scientific experiments (and empirical studies in general) for objectively assessing the energy efficiency and sustainability of complex software systems.

Appendix 2. Programme curriculum



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 theses. Information on the theses is available from Academion upon request.

The panel also studied other materials, which included:

- Self-evaluation report

Appendices to the self-evaluation report:

1. BETA Organogram
2. Professional Advisory Board (PAB) meeting notes

3A. Study progress and intake numbers, 3B. Course registrations, success rates and no shows

4. Factsheet Master Computer Science
5. Exit qualifications M CS
6. On the need for English, 6A. Vision on internationalization
7. Nationale Studenten Enquête (NSE) 2025
8. Assessment plan
9. Assessment programme
10. Annual report programme committee 23-24
11. Teaching and Exam Regulations (TER) 24-25
12. Student overview
13. Staff overview
14. Assessment policy faculty of science 2022
15. Examination Board Rules and Guidelines
16. Study guide
17. Annual report examination board 23-24
18. Assessment rubric master project
19. An overview of the students who successfully completed their Master project 2022 & 2023 (2024 list will be added early September)
20. ACM guidelines
21. Master Project Course manual
22. MSc Computer Science VU_UvA Alumni questionnaire
23. MSc Computer Science Alumni questionnaire 2025 (Antwoorden)
24. The “Nationale Alumni Enquête” (NAE)/National Alumni Survey

Course materials

1. Logical verification 2024-2025 (FCC), Study guide 2024-2025, Canvas 2024-2025
2. Distributed Algorithms 2023-2024 (FCC), Study guide 2024-2025, Canvas 2024-2025
3. Web Services and Cloud-based Systems 2023-2024 (BDE & UvA), Study guide 2024-2025
4. Green lab 2024-2025 (SEG), Study guide 2024-2025, Canvas 2024-2025
5. Programming Large-scale Parallel Systems 2024-2025 (CSI), Study guide 2024-2025, Canvas 2024-2025
6. Multi-core Processor Systems 2023-2024 (CSI & UvA), Study guide 2024-2025
7. History of Digital Cultures 2023-2024 (Societal Perspectives of Computer Science), Study guide 2024-2025, Canvas 2024-2025