BACHELOR'S PROGRAMME

COMPUTER SCIENCE AND ENGINEERING

FACULTY OF ELECTRICAL ENGINEERING,
MATHEMATICS AND COMPUTER SCIENCE

DELFT UNIVERSITY OF TECHNOLOGY

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This report was finalized on 8 January 2020.

REPORT ON THE BACHELOR'S PROGRAMME COMPUTER SCIENCE AND ENGINEERING OF DELFT UNIVERSITY OF TECHNOLOGY

This report takes the NVAO's Assessment Framework for the Higher Education Accreditation System of the Netherlands for limited programme assessments as a starting point (September 2018).

ADMINISTRATIVE DATA REGARDING THE PROGRAMME

Bachelor's programme Computer Science & Engineering

Name of the programme:	Computer Science & Engineering
CROHO number:	56964
Level of the programme:	bachelor's
Orientation of the programme:	academic
Number of credits:	180 EC
Specializations or tracks:	None
Location(s):	Delft
Mode(s) of study:	full time
Language of instruction:	English
Submission deadline NVAO:	01/05/2020

The visit of the assessment panel Computer Science to the Faculty of Electrical Engineering, Mathematics and Computer science of Delft University of Technology took place on 26 and 27 June 2019.

ADMINISTRATIVE DATA REGARDING THE INSTITUTION

Name of the institution:	Delft University of Technology
Status of the institution:	publicly funded institution
Result institutional quality assurance assessment:	positive

COMPOSITION OF THE ASSESSMENT PANEL

The NVAO has approved the composition of the panel on 15 april 2019. The panel that assessed the bachelor's programme Computer Science and Engineering and the master's programme Computer Science consisted of:

- Em. prof. dr. T. (Theo) D'Hondt, emeritus professor in Software Languages and Software Engineering at the Faculty of Sciences and Bioengineering Sciences of Vrije Universiteit Brussel (Belgium) [chair];
- Prof. dr. ir. W.E.A. (Wim) Van Petegem, professor and policy coordinator Learning Technologies at the Faculty of Industrial Engineering Technology of KU Leuven (Belgium);
- Prof. dr. S. (Sjouke) Mauw, professor in Security and Trust of Software Systems at the Department of Computer Science of the University of Luxembourg (Luxembourg);
- A. (Antonia) Wildvank, owner and manager of the company Wildvank Management en Advies;
- B. (Baran) Erdogan, third year bachelor's student Computer Science at the University of Amsterdam [student member].

The panel was supported by M. (Mark) Delmartino MA, who acted as secretary.

WORKING METHOD OF THE ASSESSMENT PANEL

The site visit to the bachelor's programme Computer Science at the Faculty of Electrical Engineering, Mathematics and Computer Science of Delft University of Technology was part of the cluster assessment Computer Science. Between June and December 2019 the panel assessed 29 programmes at 10 universities. The following universities participated in this cluster assessment: Leiden University, Delft University of Technology, University of Utrecht, Eindhoven University of Technology, Open University, University of Amsterdam, Vrije Universiteit Amsterdam, Radboud University, University of Groningen and University of Twente.

On behalf of the participating universities, quality assurance agency QANU was responsible for logistical support, panel guidance and the production of the reports. P.A. (Peter) Hildering MSc. was project coordinator for QANU. P.A. (Peter) Hildering MSc. and M. (Mark) Delmartino MA acted as secretary in the cluster assessment.

During the site visit at Delft University of Technology the panel was supported by Mark Delmartino, who is a certified NVAO secretary.

Panel members
The members of the cluster assessment panel were selected based on their expertise, availability and independence. The panel consisted of the following members:

- Em. prof. dr. T. (Theo) D'Hondt, emeritus professor in Software Languages and Software Engineering at the Faculty of Sciences and Bioengineering Sciences of Vrije Universiteit Brussel (Belgium) [chair];
- Prof. dr. ir. W.E.A. (Wim) Van Petegem, professor and policy coordinator Learning Technologies at the Faculty of Industrial Engineering Technology of KU Leuven (Belgium);
- Prof. dr. S. (Sjouke) Mauw, professor in Security and Trust of Software Systems at the Department of Computer Science of the University of Luxembourg (Luxembourg);
- Prof. dr. J.J. (John-Jules) Meyer, full professor Computer Science and Artificial Intelligence at Utrecht University;
- Drs. L. (Lennart) Herlaar, owner/director at Redbits.nl, a company specialized in software development and IT consultancy, and assistant professor Computer Science at the Faculty of Science of Utrecht University;
- A. (Antonia) Wildvank, owner/CEO at Wildvank Management en Advies, specialized in IT-management and -consultancy;
- Prof. dr. J. (Jan) Aerts, full professor Visual Data Analysis at the University of Hasselt and associate professor Visual Data Analysis at the faculty of Engineering Science at KU Leuven (Belgium).
- Drs. H.C. (Jeroen) Borst, senior consultant Smart Cities at TNO;
- Prof. dr. P. (Petros) Koumoutsakos, full professor Computational Science at ETH Zürich (Switzerland).
- Prof. dr. ir. J.M.W. (Joost) Visser Chief Product Officer at Software Improvement Group Nederland and professor Large-scale Software Systems at Radboud University;
- Drs. E.A.P. (Ewine) Smits Manager in Advanced Analytics & Big Data at KPMG Nederland;
- Prof. dr. D.P. (Danilo) Mandic, full professor Signal Processing at the department of Electrical and Electronic Engineering of Imperial College London (United Kingdom);
- Dr. ir. J.C. (Job) Oostveen, Research Manager at the Department Monitoring and Control Services at TNO;
- Prof. dr. B.A.M. (Ben) Schouten, full professor Playful Interactions at Eindhoven University of Technology.
- Dr. ir. N. (Nico) Plat, owner/CEO at Thanos IT-consultancy and architecture;
- N. (Nienke) Wessel BSc, master's student Computing Science, master's student Mathematics and bachelor's student Linguistics at Radboud University Nijmegen [student member];
- E. (Evi) Sijben BSc, master's student Computing Science in the specialization track Data Science at Radboud University Nijmegen [student member];

- B. (Baran) Erdogan, third year bachelor's student Computer Science at University of Amsterdam [student member];
- M. (Martijn) Brehm, third year bachelor's student Computer Science at University of Amsterdam [student member].

Preparation
On March 21st, 2019, the panel chair was briefed by QANU on his role, the assessment framework, the working method, and the planning of site visits and reports. A preparatory panel meeting was organized on May 9th, 2019. During this meeting, the panel members received instruction on the use of the assessment framework. The panel also discussed its working method and the planning of the site visits and reports.

The project coordinator and secretary composed a schedule for the site visit in consultation with the Faculty. Prior to the site visit, the Faculty selected representative partners for the various interviews. See Appendix 4 for the final schedule.

Before the site visit to Delft University of Technology, QANU received the self-evaluation reports of the programmes and sent these to the panel. A thesis selection was made by the panel's chair and secretary. The selection existed of 15 theses and their assessment forms for the programmes, based on a provided list of graduates in the academic years 2016-2017 and 2017-2018. A variety of topics and tracks and a diversity of examiners were included in the selection. The secretary and panel chair ensured that the distribution of grades in the selection matched the distribution of grades of all available theses. After studying the self-evaluation report, theses and assessment forms, the panel members formulated their preliminary findings. The secretary collected all initial findings and questions and distributed these amongst all panel members.

At the start of the site visit, the panel discussed these initial findings, identified the key issues to be discussed during the sessions, and agreed on a division of tasks during the site visit.

Site visit
The site visit to Delft University of Technology took place on 26 and 27 June, 2019. Before and during the site visit, the panel studied the additional documents provided by the programmes. An overview of these materials can be found in Appendix 5. The panel conducted interviews with representatives of the programmes: students and staff members, the programme's management, alumni and representatives of the Board of Examiners. It also offered students and staff members an opportunity for confidential discussion during a consultation hour. One student made use of this opportunity.

Towards the end of the site visit, the panel discussed its findings in an internal meeting. Afterwards, the panel chair publicly presented the panel's preliminary findings and general observations.

The visit was concluded with a development conversation, in which the panel and the programmes discussed various development routes for the programmes. The result of this conversation is summarized in a separate report.

Consistency and calibration
In order to ensure the consistency of assessment within the cluster, following measures were taken: the panel composition ensured regular attendance of three core panel members, including the chair, and the project coordinator was present at the internal panel meeting discussing the preliminary findings of each programme at all site visits.

Report
After the site visit, the secretary wrote a draft report based on the panel's findings and submitted it to the project coordinator for peer assessment. Subsequently, the secretary sent the report to the panel. After processing the panel members' feedback, the project coordinator sent the draft report to the Faculty in order to have it checked for factual irregularities. The project coordinator discussed

the ensuing comments with the panel's chair and changes were implemented accordingly. The report was then finalized and sent to the Faculty and University Board.

Definition of standards and decision rules
In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the following definitions for the assessment of the standards:

Generic quality
The quality that, from an international perspective, may reasonably be expected from a higher education Associate Degree, Bachelor's or Master's programme.

Meets the standard
The programme meets the generic quality standard.

Partially meets the standard
The programme meets the generic quality standard to a significant extent, but improvements are required in order to fully meet the standard.

Does not meet the standard
The programme does not meet the generic quality standard.

The panel used the following definitions for the assessment of the programme as a whole:

Positive
The programme meets all the standards.

Conditionally positive
The programme meets standard 1 and partially meets a maximum of two standards, with the imposition of conditions being recommended by the panel.

Negative
In the following situations:
- The programme fails to meet one or more standards;
- The programme partially meets standard 1;
- The programme partially meets one or two standards, without the imposition of conditions being recommended by the panel;
- The programme partially meets three or more standards.

SUMMARY JUDGEMENT

This evaluation concerns the bachelor's programme Computer Science and Engineering (CSE), a three-year full-time 180 EC programme offered by the Faculty of Electrical Engineering, Mathematics and Computer Science at the Delft University of Technology.

The CSE programme aims to prepare students both for a master's programme in the field of computer science and for the labour market. In order to reach this goal, the programme emphasizes theoretical and conceptual knowledge, ensures that students know the role of scientific research, enables students to conduct research under supervision, and focuses on the application of theory and on co-operation in teams during course work and projects. An important item of discussion during the site visit was the increased number of bachelor students in the CSE programme: since the programme is offered in English, as of 2017-2018, the intake has temporarily risen to close to 900 students.

The programme's ambitions are embedded properly in the intended learning outcomes, which in turn are founded in the national 3TU Criteria, the European-wide Dublin Descriptors and the international ACM curriculum. The panel considers that the formulation of the intended learning outcomes appropriately reflects the discipline, level and orientation of the programme. Because it is not mentioned explicitly in the end qualifications, the panel recommends the programme to ensure that CSE students (learn to) work together in multidisciplinary teams during their bachelor's study. The panel appreciates the recent revival of the External Advisory Board and encourages its representatives to provide the programme with timely input on the expectations of the professional field with regard to the competencies of computer science graduates.

The teaching-learning environment of the CSE programme is up to standard. The curriculum is strong and in full alignment with the programme profile, the intended learning outcomes and the international disciplinary requirements. The curriculum structure and its courses are interesting. The educational concept is appropriate and implemented rigorously. Talented students attending the honours programme appreciate this additional opportunity. Long-standing faculty is highly qualified in terms of both disciplinary know-how and didactics. Student services organized both centrally and at programme level facilitate the study period of CSE bachelor students. The panel noticed that the programme underwent a number of changes recently–an updated curriculum, a different language of instruction, and an unexpectedly large increase of student numbers. These changes have impacted to various extents on the teaching-learning environment. The panel understands and supports the rationale for the management decisions behind the curriculum update and English language programme. Furthermore, the panel considers that the management has taken adequate measures to mitigate the effect of the increase in student numbers on the teaching-learning environment. One measure in particular, the implementation of team teaching, deserves praise and constitutes a good practice example for replication in other programmes. Notwithstanding the panel's overall appreciation, there are two elements that are being addressed but require attentive monitoring: the (explicit and visible) coverage of academic skills in the curriculum, and the measures for (newly appointed) staff to obtain the university teaching qualification and the English language certification.

Student assessment is well organized in the CSE programme. The policy and principles underlying the course assessments are fine. The constructive alignment principle is applied in the day-to-day reality of teaching and assessment. The panel considers that CSE course assessments are valid, reliable and transparent. Based on its review of thesis assessments, the panel noticed that there is room for improvement with regard to the way final grades are accounted for in the assessment form through rubrics and/or feedback. The panel welcomes the new thesis assessment form and invites the programme management to monitor that in the future assessors make full use of the opportunities offered by this new assessment form, notably by motivating their sub-grades/final mark through qualitative feedback. The Board of Examiners has accumulated good expertise and produced relevant policy documents since the previous assessment. In view of programme developments in terms of student numbers and curriculum update, the panel invites the Board of Examiners to take a more proactive attitude in assuring the quality of assessment.

Students who graduate from the CSE programme are adequately prepared for a follow-up study or a position on the labour market. Having established that all final bachelor projects meet the expectations of a final academic project at bachelor level, it is fair to state that the intended learning outcomes of the CSE programme are achieved at the end of the curriculum. Moreover, while most CSE graduates pursue a master's degree, a significant minority decides to enter the labour market as employee or entrepreneur. The panel considers that the CSE programme constitutes a relevant preparation for these graduates, as well.

In sum, the panel concludes that the quality of the bachelor's programme CSE is up to standard on all accounts, hence its overall positive conclusion.

The panel assesses the standards from the *Assessment framework for limited programme assessments* in the following way:

Bachelor's programme Computer Science and Engineering

Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive

The chair, em. Prof. dr. T. (Theo) D'Hondt, and the secretary, M. (Mark) Delmartino MA, of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 8 January 2020

DESCRIPTION OF THE STANDARDS FROM THE ASSESSMENT FRAMEWORK FOR LIMITED FRAMEWORK ASSESSMENTS

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
The bachelor's programme in Computer Science and Engineering (CSE) is provided by the Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS) of Delft University of Technology. The faculty offers two other bachelor's programmes and six master's programmes. CSE graduates are directly admitted to the master's programmes in Computer Science, Computer Engineering and Embedded Systems. The faculty is organized in six departments; almost all CSE courses are provided by two departments devoted to computer science studies: Intelligent Systems and Software Technology.

CSE is a three-year academic bachelor's programme that aims to prepare students both for a master's programme in the field of computer science and for the labour market. In order to reach this goal, the programme emphasizes theoretical and conceptual knowledge, ensures that students know the role of scientific research, enables students to conduct research under supervision, and focuses on the application of theory and on co-operation in teams during course work and projects.

The programme aims are also reflected in the intended learning outcomes (ILOs) of the bachelor's programme CSE, which are listed in appendix 2 to this report. The panel noticed that the ILOs of the programme have been formulated according to the so-called 3TU Criteria for academic bachelor's curricula in engineering in the Netherlands. These criteria, as well as the programme ILOs, are designed using the five Dublin Descriptors.

There is a common understanding among Dutch universities offering computer science programmes that the so-called ACM Computer Science Curricula 2013 serve as domain-specific framework of reference for undergraduate programmes. This is also the case for the bachelor's programme CSE, whose ILOs cover the eleven characteristics of computer scientists as formulated by the Association for Computing Machinery. These characteristics, as well as a link to the reference document, are provided in Appendix 1 to this report.

The previous assessment committee noted in 2013 that the set of ILOs was not optimal and supported the programme's intention to make the level and orientation more visible and their formulation more specific for the domain of computer science and engineering. The current panel learned that the ILOs have undergone three rounds of modification: right after the previous visit, the formulation was amended in line with the remarks of the assessment committee; in 2018, the ILOs were re-written according to the 3TU Criteria; and at the time of the site visit (June 2019), a new version was available–to be used as of the academic year 2019-2020 - with intended learning outcomes whose formulation was even more concrete and more applicable to a degree programme in computer science and engineering. The panel acknowledges the quality and relevance of the ILOs according to the 3TU Criteria and welcomes the further adjustments that are envisaged as of September 2019. In addition to paying proper attention to disciplinary knowledge, research and design, cooperation and communication skills, the panel finds it particularly important that the new ILOs also explicitly refer to–and expect the CSE graduate to take into account - the ethical, temporal and social context.

The panel did notice, however, that the multidisciplinary dimension is no longer explicitly addressed in the new ILOs. It therefore advises the programme to ensure that working together in a professional manner in a multidisciplinary environment gets proper attention in the curriculum.

The panel learned that there have always been contacts with potential employers, but that these contacts have not been used systematically as input for the study programme. After several years of inactivity, the CS External Advisory Board (EAB) met again early 2019. The EAB consists of alumni and representatives of companies and organizations that hire graduates. From the discussions with programme management and EAB representatives, the panel understood that there is a strong intention to continue these meetings in a structural way in the future. An important and recurring theme in these meetings will be the knowledge, skills and attitude which EAB representatives seek in computer science graduates from TU Delft. The panel appreciates the efforts to revive the EAB, and urges the programme to continue seeking advice from a body that is representative for the broad employment field of computer science.

Considerations
The panel considers that the bachelor's programme CSE has a clear double goal of preparing students for both a master's programme and the labour market. This ambition is embedded properly in the intended learning outcomes, which are grounded in the national 3TU Criteria, the European-wide Dublin Descriptors and the international ACM curriculum.

The panel thinks highly of the efforts undertaken by the programme to address the remarks from the previous assessment committee with regard to the ILOs and considers that the formulation of both the current and envisaged ILOs is very appropriate. Nonetheless, the panel does recommend the programme to ensure that CSE students (learn to) work together in multidisciplinary teams during their bachelor's study.

The panel appreciates the recent revival of the External Advisory Board and encourages its representatives to provide the programme with timely input on the expectations of the professional field with regard to the competencies of computer science graduates.

Conclusion
Bachelor's programme Computer Science and Engineering: the panel assesses Standard 1 as ' meets the standard'.

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

Student numbers
An important item for discussion during the site visit was the increased number of bachelor students in the CSE programme. At the time of the previous accreditation, just over 200 first-year students enrolled; since the academic year 2017-2018, the inflow of bachelor students has risen enormously with the 2018 intake numbering 864 students. There are reasons which contribute to explaining the growing interest for studying computer science and engineering at TU Delft–the greater impact of computer science in society, the rising international status of the university–but the most significant factor is undoubtedly the decision to use English as the language of instruction, as of 2017-2018, thereby opening up the bachelor CSE programme to international students. During the visit, the programme management indicated that some increase in student numbers had been anticipated, but not one of this size.

The programme has reacted to this development by appointing a taskforce to investigate possible measures that ensure the quality of education now and in the future. The steep increase in student numbers has a considerable impact on the teaching and learning environment of the programme: the didactical approach, the number of staff and the teaching and learning facilities all need reconsideration to accommodate so many students with different international and intercultural

backgrounds if the programme wants to maintain a similar quality level of education for all students. The panel shared its worries with several interlocutors that the high number of incoming students would affect the quality of the programme. Throughout the discussions, however, the panel learned that the programme management, with the backing of the faculty management and the university, is implementing several measures recommended by the taskforce to mitigate the impact of the recent student growth on the programme and to address the envisaged student intake in the near future. One solution is to introduce a *numerus fixus* for the academic year 2019-2020. While individual measures will be discussed throughout this section of the report, the panel overall thinks that the management has devised adequate plans and is implementing appropriate measures to address the situation now and in the near future. This appreciation of the panel is also based on its discussion with the faculty management which supports–also financially–the plans of the CSE programme team.

Curriculum
The bachelor programme CSE amounts to 180 EC, which are spread equally over three years of four quarters each. The panel learned that as of September 2018, the structure of the curriculum has changed and that these changes are implemented gradually, year by year. Appendix 3 provides an overview of the curriculum as it is offered in the academic year 2018-2019.

Both the old and the new curriculum start with twelve compulsory courses in year one; in year two students take a range of compulsory courses and choose one of three variants–Data & AI, Systems or Multimedia–each consisting of three courses. The first semester of year three is dedicated to a minor: CSE students often opt for university-wide thematic minors in fields such as robotics and finance; others follow an exchange programme at a partner university abroad. The third quarter of the third year is spent on three courses, which were compulsory before and will be electives as of 2020-2021 (as described in curriculum 2018-2019). Furthermore, students take part in a software engineering project (15 EC), which no longer serves as final 'thesis' but is scheduled in the final quarter of year two. In the new curriculum, the final project in year three consists of an individual research project of 15 EC.

The panel obtained extensive information on the bachelor's programme and its new CSE curriculum in the self-evaluation report and the annexes. It gathered from the written materials and the discussions on site that the curriculum update had been meticulously prepared by a dedicated curriculum committee. Studying the materials, the panel found that the curriculum had–and continues to have–a relevant structure of courses and projects that together cover the intended learning outcomes, as well as the eleven characteristics of computer scientists and the fourteen knowledge areas defined by the ACM Curricula 2013. According to the panel, the curriculum is in full alignment with the programme profile, the intended learning outcomes and international domain specific requirements.

The CSE curriculum is composed of eight learning paths. Six paths consist of courses teaching computer science knowledge and skills: Data & AI, Mathematics, Models, Multimedia, Software, and Systems. The other paths–Academic & Professional Skills, and Responsible Computer Science–teach students the academic, social and ethical skills that are required by computer scientists. In order to ensure that these skills are applied in a computer science setting, the latter paths are integrated in the courses of the six disciplinary paths. The panel noticed that the six learning paths are present to different extents in the compulsory and elective parts of the curriculum: the learning path 'software' is most prominent in the compulsory part, whereas students have ample opportunities in the elective part to sharpen their competencies in the curriculum variants Data and AI, Multimedia and Systems. The panel understood from talking to students, most of whom were following the old curriculum, that the substance of the two interwoven learning paths is addressed but can be more visibly and explicitly accounted for in the other courses. The lecturers agreed to this comment and indicated that these elements are addressed systematically and more explicitly throughout the new curriculum. In fact, lecturers teaching in the first year informed the panel that they already notice a difference in the level of academic skills as demonstrated by students who are about to finish their first year according to the new curriculum. The panel acknowledges this positive message and encourages the

programme to continue monitoring that academic and professional skills, as well as responsible computer science are effectively integrated in the disciplinary courses and learning paths. Overall, the panel finds the CSE curriculum strong and its individual courses highly interesting.

Students who desire more challenges can participate in the university-wide Honours programme, which consists of centrally offered courses and a faculty-specific programme. The EEMCS offers honours students three options: perform a research project, participate in a programming championship, or take part in a so-called 'Dream Team'. Talented students can also join the new interdisciplinary honours programme, Next Generation Robotics, which is restricted to bachelor students in CSE, Electrical, Mechanical or Aerospace Engineering. The panel understood from current and former honours students that they highly appreciate these programmes and that as talented secondary school graduates they partly based their decision to enrol at TU Delft because of the opportunity to join a Dream Team.

Educational concept
The curriculum is implemented according to the constructive alignment principle: students use their own activities to develop new knowledge, while building on their prior knowledge. This entails that lecturers are supposed to clearly formulate expected prior knowledge, set study goals that are based on the programme ILOs, choose appropriate forms of assessment, and align their teaching methods with the type of assessment. The panel gathered from the discussions with students and staff that in the day-to-day teaching and assessment practice, the principles of constructive alignment are upheld by the lecturers. The panel appreciates both the concept and way in which it is implemented in the programme.

The CSE programme provides students not only with theoretical knowledge of computer science, but also emphasizes the importance of applying this knowledge. Hence, almost every course has a lab in which students apply the newly acquired knowledge thereby gaining valuable skills and new insights. In order to mitigate the effect of the growing enrolment figures, the programme now offers lab sessions where first-year students attending one of three foundational courses can work on their assignments in the presence of teaching assistants who have been trained to provide support with all three courses. Students indicated that they appreciate this opportunity. The panel welcomes the shared lab sessions as a relevant measure, both didactically and organizationally.

Changing the language of instruction has impacted on the programme didactics in different ways: first of all, the composition of the student body has shifted from previous cohorts where 90% were Dutch-speaking students to the 2018 cohort where about half of the students were non-Dutch speakers. Furthermore, the programme had to ensure that all–not just some–material was available in English and that all lecturers were capable of teaching in (correct) English. Bachelor students–both Dutch and international - indicated to the panel that they welcome the conversion to a full-fledged English language programme. The quality of the materials is adequate and this also applies to the English language skills of most lecturers. A few students nonetheless remarked that there is room for improvement in so far as the English language skills of all lecturers is concerned: the panel agrees that the bachelor CSE is now an English-only programme and that for such international programme it is appropriate to have high language expectations of the entire teaching body. Furthermore, students appreciate the international dimension in the classroom and the balance (in cohort 2018) between Dutch and non-Dutch students as this facilitates inter-cultural integration and forces all students to speak English. The panel is agreeably surprised that the programme managed to attract a comparable number of Dutch and non-Dutch students in such a short period and welcomes the beneficial impact it has on the international classroom and the intercultural integration.

Notwithstanding the unexpectedly large increase in student numbers, the panel applauds the decision of the management to offer the CSE bachelor programme in the English language. Following comments from alumni and employers, the panel does advise the programme to ensure that international students can benefit from Dutch language courses to facilitate their integration in the

Dutch labour market afterwards: while the working language at several companies may be English, the company culture often requires at least some knowledge of the Dutch language.

Feasibility
The programme aims to schedule courses in the best possible way for students: lecturers who teach parallel courses during one quarter co-ordinate their deadlines and teaching methods to smoothen the workload and offer a variety of approaches. The course contents build on prior knowledge, which entails that students follow courses and learning paths in a particular order. The panel studied the curriculum scheme, which is available for students in the CSE Curriculum Handbook. Students indicated in the Student Chapter and confirmed during the site visit that all parts of the programme fit well together, that course deadlines are aligned within one quarter, and that both the individual courses and the overall curriculum are feasible.

At the end of the first year, students receive a Binding Study Advice when they have successfully obtained 45 EC (out of a maximum 60 credits). Over the years, on average 55% of students received a positive recommendation, while 25% did not pass the BSA and another 20% withdrew from the programme within the first semester. At the time of the site visit, it was not yet possible to establish whether the growing number of incoming students–and the share of international students therein–would affect the BSA rates.

Of all students passing the BSA, roughly one third finishes the programme in the set time frame of three years, and another 20% does so within four years. The programme tries to increase these figures by inviting second-year students who did not pass all first-year courses to make a realistic study plan for the rest of their studies under supervision of the academic counsellors. This initiative is appreciated by students, but implemented too recently for the panel to notice as yet any effect on the study yield.

Furthermore, the panel noticed that the drop-out rate among students who pass the BSA is very limited. However, a considerable number of students take many years to finish the bachelor's programme. Several interlocutors–including alumni referring to their own trajectory–indicated that students have part-time jobs in the field of computer science that cause delay and distract them from finishing the degree programme.

Taking all elements together, the panel found that the CSE curriculum as a whole and its individual course components are feasible. It appreciates the measures that are being taken to increase the success rate. The panel is aware that very often reasons for completing the study with a considerable delay are outside the scope of the programme.

Staff
The self-evaluation report compares the number of staff active in the CSE programme in January 2017 and in January 2019. The number of faculty increased from 50 to 69, with the share of female scientific staff growing from 20% to 25%. In order to maintain quality levels of education in 2017 and 2018, the programme hired an additional five full-time equivalents (fte) scientific staff, more than five fte lecturers, two fte PhD candidates and more than five fte teaching assistants. The panel welcomes these recent appointments and encourages the programme team to continue implementing the recruitment plans that were set following the recent increase in student numbers.

The panel learned that due to the high number of recent appointments, several teaching staff are either following the university teaching qualification (UTQ) or are on the waiting list to start UTQ. Similarly, many newly recruited staff have not yet completed the assessment/certification regarding the English language requirement (CEFR level C1). The panel understands that the qualification and certification rates also depend on the available capacity of trainers and on the priorities of each individual lecturer. It encourages the programme to monitor carefully the progress of all new staff in complying with didactical and language requirements.

Following the recommendation by the taskforce, the programme installed a teaching team to assist scientific staff in the execution of the bachelor courses. The team consists of full-time lecturers, PhD candidates with a teaching task and software developers. Each course is provided by three types of educators: scientific staff responsible for the course and the above-mentioned principles of constructive alignment, CSE teaching team members, and teaching assistants. While teaching team members essentially teach, they are also linked to a research group in order to keep up-to-date with their scientific field. Moreover, the programme hired two part-time education software developers to amend existing course materials and develop new educational software. The panel commends the programme for implementing this team teaching approach.

Students indicated to the panel that they are generally satisfied with the quality of the faculty staff, an appreciation that encompasses disciplinary know-how, educational skills and language proficiency. Moreover, many of the teaching team lecturers are very much appreciated for their competences and availability. Having met some of these dedicated teaching team members, the panel understands the enthusiasm of the students. According to the panel, these teaching team members are a valuable addition to the long-standing and highly qualified faculty.

Nonetheless, the panel also acknowledges the comments from bachelor students in the Student Chapter and during the visit that there are differences in quality and style of the teaching. While lecturers usually have a good grip on the course contents, the didactics sometimes leave to be desired. The panel believes that the programme's growing emphasis on didactics (and didactics training) will eventually increase the teaching qualities of the less education-minded lecturers.

Facilities
The activities related to the CSE programme are currently split over two buildings on the TU Delft campus: lectures mainly take place in the former faculty building, while lecturers and research facilities are hosted in the new EEMCS building. Students indicated to the panel that they find this a unfortunate situation because it reduces the opportunity to access lecturers. The panel was informed by the faculty management that a new building is under construction and will eventually gather lecture halls, faculty and research facilities.

Given the growth in student numbers, the lectures for certain courses are split with one and the same course being offered on two different moments. This decision is based on didactical grounds and also on the fact that there are hardly any halls on campus that are suited for teaching purposes and cater for over 800 students. According to the panel, the teaching teams are a timely measure to counterbalance some of the consequences of the student growth.

Apart from university-wide services, such as the electronic learning environment Brightspace or a state-of-the-art library, the EEMCS faculty has at disposition a number of trained academic counsellors who can support students on a variety of issues such as studying with a disability, study delay, study planning sessions, etc. Furthermore, the CSE programme facilitates the transfer of students from secondary education to university by forming mentoring groups of 15 students who can share experiences and find study partners. These groups are used as a basic unit of organization when scheduling larger-scale instruction and lecture sessions. By doing so, first-year students move in the same circles on a regular basis, which in turn increases their social contacts. The panel understood from the discussions on site that students appreciate the services offered by the faculty as well as the programme initiatives to create familiar surroundings in a large-scale programme.

The study association "Christiaan Huygens" plays an important role in gathering feedback from students and in sharing this feedback with the appropriate faculty structures and–in the case of the informative Student Chapter–with the panel. Similarly the Faculty Student Council and the Education Committee offer formal channels for students to voice their concerns. While students invariably indicated that individual faculty and lecturers are open to their feedback, the panel has the impression from the discussions on site that the official communication between students and faculty is less than optimum: while both informal and formal mechanisms are in place, and students are heard, the

decisions of the management are not always properly communicated to, or noticed by, students. The panel welcomes in this regard the intention of the programme management to monitor that all modifications to a course are communicated by the respective faculty/lecturer at the start of the new course run. Moreover, decisions based on student feedback will also be shared systematically at Faculty Council meetings.

Considerations
The panel considers that the teaching-learning environment of the CSE programme is up to standard. The curriculum is strong and in full alignment with the programme profile, the intended learning outcomes and the international disciplinary requirements. The curriculum structure and its courses are highly interesting. The educational concept is appropriate and implemented rigorously. Talented students attending the honours programme appreciate this additional opportunity. Long-standing faculty is highly qualified in terms of both disciplinary know-how and didactics. Student services organized both centrally and at programme level facilitate the study period of CSE bachelor students.

The panel noticed that the programme recently underwent a number of changes–an updated curriculum, a different language of instruction, and an unexpectedly large increase of student numbers. These changes have to various extents impacted on the teaching-learning environment. The panel understands and supports the rationale for the management decisions behind the curriculum update and English language programme. Furthermore, the panel considers that the management has taken adequate measures to mitigate the effect of the increase in student numbers on the teaching-learning environment. One measure in particular, the implementation of team teaching, deserves praise and constitutes a good practice example for replication in other programmes.

While the quality of the teaching-learning environment is definitely appropriate, there are two elements which are being addressed but require attentive monitoring: the explicit and visible coverage of academic skills in the curriculum, and the measures for (newly appointed) staff to obtain the university teaching qualification and the English language certification.

Conclusion
Bachelor's programme Computer Science and Engineering: the panel assesses Standard 2 as meets the standard'..

Standard 3: Student assessment
The programme has an adequate system of student assessment in place.

Findings

Assessment system
The panel obtained extensive information in the self-evaluation report and the annexes on the principles that underpin student assessment in the CSE programme. It gathered from the written materials that the bachelor's programme adheres to the EEMCS Faculty Assessment Policy and is implementing the procedures described in the Programme Specific Assessment Policy of the computer science programmes. Organizing the curriculum components according to the constructive alignment theory, the learning goals of individual courses are derived from the intended learning outcomes at programme level, and the specific assessment form of a course is chosen based on its alignment with the teaching method of that course. Furthermore, each course assessment is checked on quality principles with regard to validity, reliability, transparency and efficiency.

Most courses consist of lectures, instruction sessions to practice skills under supervision, and lab sessions in which students apply their newly acquired knowledge and skills. During these sessions different types of formative assessments are held. Lecturers can decide to have part of the final grade be determined by student assignments. The major part of the course grade is assigned through

a summative assessment on paper or as a digital examination. Apart from courses, CSE students are involved in one project per year: the object oriented programming project, the software project and the research project. During these projects, students receive frequent feedback; the grading is guided by a dedicated set of rubrics for each project. The panel found student assessment to be well organized and based on relevant principles and policies.

The panel learned from the discussions on site that the growing student numbers are affecting the way assessment is organized. TU Delft is working towards a general policy on future-proof digital assessment. Students indicated that more online tools are being used for labs and examinations, and that automated grading generally works very well. Nonetheless, students also like the project driven learning element in the CSE programme with physical lab sessions and the opportunity to ask questions to teaching assistants. Furthermore, the panel understood that CSE courses are moving away from mandatory credit-bearing assignments. Students on the one hand welcome this 'freedom', but on the other hand also recognize the importance of these assignments and should therefore not be completely abolished. The panel agrees with the viewpoint of the programme management that students who use the opportunity to make 'non-mandatory' assignments, will receive good quality feedback on their 'homework'.

Course and thesis assessments
The panel noticed that the assessment principles underlying the programme are sound and have been rigorously implemented in the individual courses. On site the panel looked into course materials and their respective assessment forms and found these to be appropriate: the questions were valid and reliable. Students indicated to the panel that they are properly and timely informed about the respective course assessments and their grading.

As part of its thesis review, the panel studied a sample of 15 thesis assessment forms completed in the academic years 2016-2017 and 2017-2018. All but one thesis concerned the group engineering project with a limited research component, as customary in the old curriculum; the other thesis was an individual research project, as envisaged in the new curriculum. The project is group based and contains individual components, which are assessed using separate assessment forms for each individual student. The panel noticed that notwithstanding the thesis sample was based on only two academic years, a variety of assessment forms have been used. Some forms consisted of extensive rubrics with limited space for free text, while other forms contained no rubrics but plenty of opportunity for handwritten or typewritten feedback notes organized per assessment criterion. While the panel agreed in most cases to the final grade given to a thesis, it was not always clear how this grade was substantiated in the assessment form. Similarly, in the cases where (extensive) written feedback was provided, the panel tended to agree to the comments, yet could not always link these comments to the grade that was eventually given to the student.

During the site visit, (master) students and alumni informed the panel that they had received extensive and useful feedback throughout the bachelor's thesis and that they agreed to, or at least understood the assessors' motivation for, the score they had eventually received on their thesis. Furthermore, the panel learned that a new thesis assessment form has been designed–and is currently piloted–for the evaluation of the new individual bachelor research project. The panel reviewed one such research project and found the assessment form to be appropriate, if properly completed. In this regard, the panel strongly recommends the programme to ensure that all assessors make optimum use of the new assessment form: this means that assessors should be encouraged to not only score the thesis by ticking the most relevant boxes in the extensive set of rubrics, but also motivate their scores through qualitative feedback in the free text boxes.

Exam committee
The quality of assessment in the CSE programme is assured by the Board of Examiners, and in particular by the Board's subcommittee on computer sciences. This subcommittee has six members–lecturers with permanent appointments in the computer science departments–and is responsible for CSE, as well as for the master's programmes in Computer Science and in Embedded Systems. The

Board of Examiners is supported by an official secretary and by the faculty's educational and assessment specialists.

The previous assessment committee reported in 2013 that the Board of Examiners functioned well but still had to give substance to its new legal responsibilities. The panel now learned that over the last few years, the Board of Examiners published new policy documents and quality assurance measures and advised the CSE programme to be alert about free-riding in group work. As a result of the latter advice, the programme has added peer review to project work and restricted the number of credits allocated to assignments. Furthermore, the Board of Examiners has paid extensive attention to fraud prevention. Currently, lecturers explain in their courses more explicitly what is correct and incorrect behaviour; moreover, fraud is an important subject in the first year Mentoring programme.

The panel appreciates the efforts of the Board of Examiners and found the documents pertaining to the assessment system to be of good quality. Moreover, the Board as a whole and the individual members of the subcommittee have the appropriate expertize for their tasks. The panel did notice, though, that there is room for a more proactive attitude of the Board of Examiners, for instance with regard to monitoring the fraud policy it had developed and to the systematic and proper use of the bachelor thesis assessment form. In this regard, the panel was surprised to notice that the variety of ways in which the final grade of the bachelor thesis had been accounted for in the assessment forms, had not been an issue for the Board of Examiners. It therefore suggests the Board of Examiners to monitor the quality of the thesis assessment in the forthcoming bachelor research project.

Considerations

The panel considers that student assessment is well organized in the CSE programme. The policy and principles underlying the course assessments are up to standard. The constructive alignment theory is applied in the day-to-day reality of teaching and assessment. Based on the discussions on site and the limited sample of individual assessments it reviewed, the panel considers that CSE course assessments are valid, reliable and transparent.

Whilst it is aware that the thesis assessment forms it reviewed reflect the assessment situation in a recent past, the panel noticed that there is room for improvement with regard to the way final grades are accounted for in the assessment form through rubrics and/or feedback. The panel welcomes the new thesis assessment form, which allows assessors to account properly for the sub-grades per criterion and the final mark. It invites the programme management to monitor that in the future assessors make full use of the opportunities offered by this new assessment form, notably by motivating their sub-grades/final mark through qualitative feedback.

According to the panel, the Board of Examiners has accumulated good expertise and produced relevant documents on the quality assurance of assessment. In view of programme developments in terms of student numbers and curriculum update, it invites the Board of Examiners to take a more proactive attitude in assuring the quality of assessment.

Conclusion

Bachelor's programme Computer Science and Engineering: the panel assesses Standard 3 as meets the standard'.

Standard 4: Achieved learning outcomes
The programme demonstrates that the intended learning outcomes are achieved.

Findings

Thesis quality
In order to establish whether students achieve the intended learning outcomes, the panel has reviewed a representative sample of 15 final bachelor projects that were accepted in the academic years 2016-2017 and 2017-2018. At that time, the bachelor's thesis consisted of a group engineering project with a limited research component. The thesis was preceded by a seminar in which students worked on a literature study in small groups. Seminar and thesis together cover all CSE intended learning outcomes. In the new curriculum, the computer science and engineering components are assessed separately: the group-based software project serves as final assessment for engineering, while the individual research project constitutes the final assessment for computer science. To smoothen the transition from bachelor thesis to research project, which will be completed in the academic year 2020-2021, a limited pilot was run in the academic year 2017-2018. As a result, the panel reviewed one such research project in its sample.

The panel found that each of the fifteen theses, individual contributions to bigger group endeavours, was of the quality that can be expected of a final project of academic orientation at bachelor level. Moreover, the panel thought that several theses, including the research project, were of good quality. In most cases, the panel agreed with the scores given by the assessors. The topics covered were relevant for the domain of computer science and offered sufficient variation in order for students to develop either a more research-oriented thesis or a rather industry-oriented topic.

Based on the sample it reviewed, the panel found that students who successfully pass both project and seminar have indeed achieved all intended learning outcomes. In the 2018 curriculum, the final assessment with separate software engineering and research projects, the research component of the final assessment will take a more prominent position. According to the panel this new approach with two projects will do (even) more justice to the double aim of the CSE programme, i.e. prepare students for further studies and for the labour market.

Alumni
In addition to verifying the quality of the final deliverables, the labour market performance of graduates is another way to establish whether students achieve the intended learning outcomes upon completion of the programme. The panel gathered from the written materials and the discussions on site that in general CSE students do not only have a positive opinion about their ability to pursue a follow-up study or a professional career, but are also effective in their education or employment career. Bachelor students indicated in the Student Chapter that they consider the CSE programme to be a good step-up for the master's programme in computer science. Moreover, there are plenty of opportunities in the bachelor curriculum where they can learn to work in a team, which prepares them for a future in industry. During the discussions on site, students and alumni emphasized that they very much like the hands-on aspect of the CSE programme, even while it still teaches them every important part of the theory behind it.

Most CSE graduates move on to a master's programme at TU Delft. The CSE programme has only limited quantitative information on the graduates who choose a different path, either studying at a different university or entering the labour market. A recent end-of-bachelor's survey showed that just over 10% of the respondents would look for a job or set-up their own company rather than enrol directly in a master's programme. Students and alumni confirmed the statement in the self-evaluation report that many students are anyway employed long before graduation, while others start a company of their own, possibly together with fellow CSE students, during their studies. All in all, the panel gathered from the written material and the discussions that CSE students/graduates are very welcome in the labour market.

Considerations
Based on its thesis review and the discussions on site, the panel considers that students who graduate from the CSE programme are adequately prepared for a follow-up study or a position on the labour market.

Having established that all final bachelor projects meet at least the minimum requirements of what can be expected from a final academic project at bachelor level–and are often of much higher quality–it is fair to state that the intended learning outcomes of the CSE programme are eventually achieved at the end of the bachelor curriculum. Moreover, while most CSE graduates pursue a master's degree, a significant minority decides to enter the labour market as employee or entrepreneur. The panel considers that the CSE programme constitutes a relevant preparation for these graduates, as well.

Notwithstanding the positive results from its sample review, the panel welcomes the new approach in the 2018 curriculum to the final assessment as it will reflect (even) better the double aim of the CSE programme, i.e. to prepare students and for further studies and for the labour market.

Conclusion
Bachelor's programme Computer Science and Engineering: the panel assesses Standard 4 as meets the standard'..

GENERAL CONCLUSION

In the previous sections, the panel has come to the conclusion that the CSE programme fulfils the quality requirements with regard to each of the four standards set by the NVAO's Assessment Framework for the higher Education Accreditation System of The Netherlands for limited programme assessments: intended learning outcomes, teaching-learning environment, student assessment, and achieved learning outcomes. Hence, the panel's overall assessment of the *bachelor's programme Computer Science and Engineering* is positive.

APPENDICES

APPENDIX 1: DOMAIN-SPECIFIC FRAMEWORK OF REFERENCE

The bachelor programme Computer Science and Engineering uses the ACM Computer Science Curricula 2013 as domain-specific framework of reference. This curriculum framework is used by many programmes across the world and the Dutch computer science programmes have agreed to use it for bachelor's as well as master's programmes. This extensive document is available at: https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf

The Association for Computing Machinery (ACM) is an internationally recognized institute that produces resources with the intention of helping computer science and similar fields advance scientifically as well as professionally. Besides giving detailed lists of subject matter to be covered in an undergraduate programme, it describes a computer science graduate in 11 characteristics.

At a broad level, the expected characteristics of computer science graduates include the following:

1. Technical understanding of computer science
2. Familiarity with common themes and principles
3. Appreciation of the interplay between theory and practice
4. System-level perspective
5. Problem solving skills
6. Project experience
7. Commitment to life-long learning
8. Commitment to professional responsibility
9. Communication and organizational skills
10. Awareness of the broad applicability of computing
11. Appreciation of domain-specific knowledge

For a more detailed coverage, please refer to chapter 3, page 23 on the above link.

APPENDIX 2: INTENDED LEARNING OUTCOMES

Bachelor's programme Computer Science and Engineering

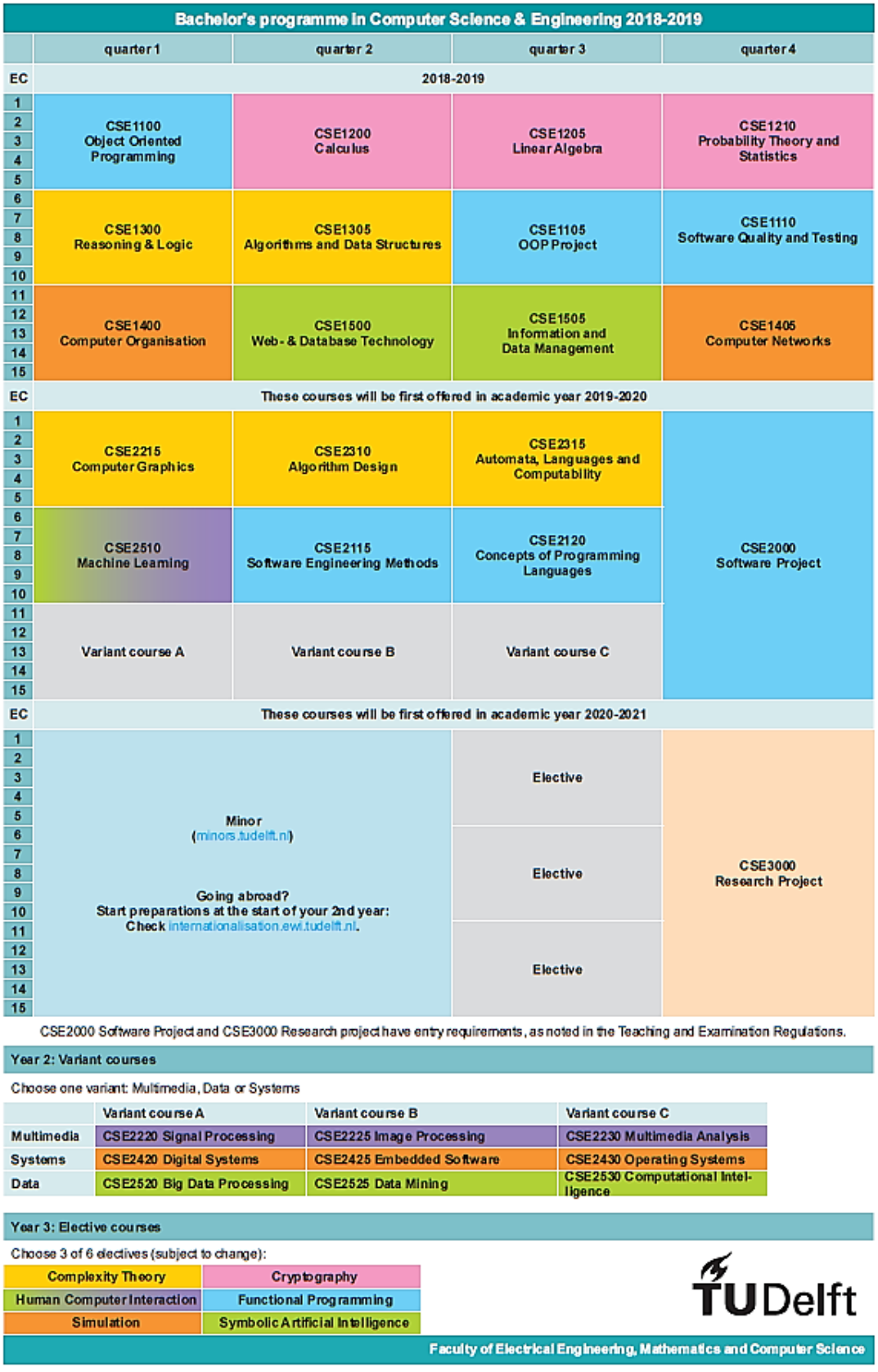
The Computer Science and Engineering graduate

1. has knowledge of the core concepts and basic methods of the field of computer science such as programming, software engineering, logic, fundamental computer science, databases, web technology, computer systems and networks, information systems and artificial intelligence, has the necessary mathematical knowledge such as a knowledge of calculus, linear algebra, probability theory and statistics, and is able to apply the above-mentioned knowledge to all kinds of problems in the field of computer science.
2. has been introduced, under supervision, to research and modelling in the field of computer science and is able to critically consult the scientific literature, analyse the underlying assumptions and determine the usability of ideas contained in the studied literature for performing the analysis and finding the solution to the studied problems.
3. can formulate the requirements to be fulfilled by a software system, take and substantiate design decisions, effectively model the aspects involved, apply a suitable software engineering method in order to implement and finally test that system. In addition, the graduate is capable of making conscious design choices and considerations in which ethical and legal preconditions and socio-economic consequences are adequately taken into account.
4. has a scientific attitude and approach to computer science, i.e. he or she understands the scientific practice of computer science, is able to apply the learned methods and techniques in order to acquire, consolidate and expand his or her knowledge, is aware of links with other disciplines and of the uncertainty, ambiguity and limitations of knowledge, and has acquired the learning skills necessary to undergo further education of a professional or academic nature.
5. can reflect critically on the field of study, i.e. he or she is able to adopt a critical approach towards and deliberate on his or her own arguments as well as those of others in order to subsequently arrive at a well-founded position, recognize and use reasoning methods, ask the right questions, and make and understand qualitative and quantitative statements in the specific field.
6. can solve complex software design problems by working together in a professional manner within a tea, also in a multidisciplinary environment, can assume different roles in the team, and is able to present the results of the work both orally and in writing to colleagues or non-colleagues.
7. is aware of the socio-economic consequences and ethical and legal consequences that ill-considered, incorrect or poorly designed systems can have, and can account for a developed computer science artefact (software, algorithm, database, system, etc.) with respect to the responsible use of data and algorithms and the software development process followed.

APPENDIX 3: OVERVIEW OF THE CURRICULUM

Bachelor's programme Computer Science and Engineering

The figures below show the curriculum of the Bachelor Computer Science and Engineering.



Bachelor's programme in Computer Science & Engineering 2018-2019

	quarter 1	quarter 2	quarter 3	quarter 4
EC	2018-2019			
1 2 3 4 5	CSE1100 Object Oriented Programming	CSE1200 Calculus	CSE1205 Linear Algebra	CSE1210 Probability Theory and Statistics
6 7 8 9 10	CSE1300 Reasoning & Logic	CSE1305 Algorithms and Data Structures	CSE1105 OOP Project	CSE1110 Software Quality and Testing
11 12 13 14 15	CSE1400 Computer Organisation	CSE1500 Web- & Database Technology	CSE1505 Information and Data Management	CSE1405 Computer Networks
EC	These courses will be first offered in academic year 2019-2020			
1 2 3 4 5	CSE2215 Computer Graphics	CSE2310 Algorithm Design	CSE2315 Automata, Languages and Computability	CSE2000 Software Project
6 7 8 9 10	CSE2510 Machine Learning	CSE2115 Software Engineering Methods	CSE2120 Concepts of Programming Languages	
11 12 13 14 15	Variant course A	Variant course B	Variant course C	
EC	These courses will be first offered in academic year 2020-2021			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Minor (minors.tudelft.nl) Going abroad? Start preparations at the start of your 2nd year: Check internationalisation.ewi.tudelft.nl.		Elective Elective Elective	CSE3000 Research Project

CSE2000 Software Project and CSE3000 Research project have entry requirements, as noted in the Teaching and Examination Regulations.

Year 2: Variant courses

Choose one variant: Multimedia, Data or Systems

	Variant course A	Variant course B	Variant course C
Multimedia	CSE2220 Signal Processing	CSE2225 Image Processing	CSE2230 Multimedia Analysis
Systems	CSE2420 Digital Systems	CSE2425 Embedded Software	CSE2430 Operating Systems
Data	CSE2520 Big Data Processing	CSE2525 Data Mining	CSE2530 Computational Intelligence

Year 3: Elective courses

Choose 3 of 6 electives (subject to change):

Complexity Theory	Cryptography
Human Computer Interaction	Functional Programming
Simulation	Symbolic Artificial Intelligence

TU Delft

Faculty of Electrical Engineering, Mathematics and Computer Science

APPENDIX 4: PROGRAMME OF THE SITE VISIT

Venue: Social Data Lab, building 28, TU Delft campus

Wednesday 26 June 2019

10.00	Arrival panel and welcome
10.15	Internal panel meeting (and lunch)
12.30	Session with management
13.00	Session with programme team
14.15	Session with bachelor students
15.00	Session with lecturers of the bachelor's programme
15.45	Open consultation
16.30	Session with Board of Examiners and assessment expert
17.15	Session with alumni, employers and external advisory board
18.00	Internal panel meeting
18.30	End of day 1

Thursday 27 June 2019

09.00	Internal panel meeting
09.45	Session with master students
10.45	Session with lecturers of the master's programme
11.30	Internal panel meeting
12.00	Final session with management
12.45	Internal panel meeting (with lunch)
15.00	Development dialogue
16.15	Plenary presentation of on preliminary findings
16.30	End of site visit

APPENDIX 5: THESES AND DOCUMENTS STUDIED BY THE PANEL

Self-evaluation report BSc Computer Science and Engineering 2019

Prior to the site visit, the panel studied 15 theses of the bachelor's programme Computer Science and Engineering. Information on the selected theses is available from QANU upon request.

Following materials were made available by the EEMCS Faculty before or during the site visit, either as hard copy or in digital format through the QANU document site or the faculty's electronic learning environment:

- ACM Computer Science Curricula 2013
- Annual Report of the BoE EEMCS 2015, 2016 and 2017
- Assessment Rubrics Research Project
- B Thesis Project Proposal Guide
- Bachelor's Thesis Guide
- Confidential list of theses
- Context Project Brightspace site
- Criteria for Academic Bachelor's and Master's Curricula
- CSE and CS Midterm audit report 2018
- CSE Annual Report 2015, 2016 and 2017
- CSE curriculum committee 2018 report
- CSE Curriculum Handbook 2018
- CSE End-of-Y1 inquiry 2017-2018
- CSE Planning Advice
- CSE Planning Chart
- Curriculum chart 2013
- Curriculum chart 2018
- Digital Study Guide (in PDF)
- Digital Study Guide Bachelor's Thesis
- EEMCS Faculty Assessment policy
- EEMCS Towards 2020
- End of BSc questionnaire report
- Evaluation Research Project 2017-2018
- Evatool quarter reports (feasibility) 2017
- Fraud prevention at EEMCS BSc's
- Intended Learning outcomes
- Internal Programme Audit Report 2018
- Leerlijnen Technische Informatica 2013
- List of staff members active in the bachelor's and the master's programme
- List of members of the Computer Science External Advisory Board
- Maatregelen Taskforce
- Midterm self-assessment report CS TUD 2015-2017
- Minutes of the CS External Advisory Board
- NSE Results CSE 2018
- Peak handling of Bachelor students
- Plans and measures to reduce the lead time of the Master Computer Science
- Programme specific assessment policy CSE, CS and ES
- Research Project Manual and Rubrics
- Rules and Regulations of the Board of Examiners EEMCS 2018/2019
- TA Procedures
- TA Training Presentation
- Teaching and Examination Regulations BSc CSE 2018-2019
- Team Teaching policy document
- Team Teaching presentation