Expert group joint opinion

Evaluation Procedure: Assessment of Study Field

Higher Education Institution: University of Latvia

Study field: Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science

Experts:

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Summary of the Assessment of the Study Field and the Relevant Study Programmes

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The study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science” (study field) is well-founded, management procedures are defined, and the management team is well-qualified and experienced. SWOT analysis is performed and the development plan incorporates its results, but unexpectedly, only a few opportunities are identified, and such opportunities, such as the possibility to get external funding, good demand of Alumni, and influential alumni are missing from the list. Admission and assessment are defined in detail, and well formalized, and all the stakeholders are well informed. A system for plagiarism detection as well as Academic Ethics Codex regulates ethics in the University of Latvia (UL).

Overall, the management of the study field is efficient, but in some cases is too informal.

The UL has a public policy of quality and has implemented means for its implementation. The relevant study programmes (first level ''Programming and Computer Network administration'', academic bachelor ''Computer Science'', academic master ''Computer Science'' and doctor ''Computer Science and Mathematics'') are developed and evaluated according to procedures. The UL/ Faculty of Computing (FC) manages the process of student complaints. The UL/ FC gathers and analyses data regarding the students, their studies, and the effectiveness of the processes. The UL/ FC provides public information about the programmes via its websites; the information is correct and sufficient for the information about the programmes, in their language of implementation. The feedback channels and the actual feedback given to various stakeholders (students, graduates, employers) are rather informal or non-documented. The employment data gathering is not sufficiently procedure and there are doubts that the people in charge have the means of efficiently performing that task.

The financial support is planned and overlooked locally by the FC and allows study field development. Funding for research is available, and a fair amount of funding is brought into the field from research projects where students of the field are involved.

The infrastructure of UL is sufficient and offers the needed equipment. Methodological and informative provision is met by the library, which offers both physical books and e-resources. Replenishing the collection is regulated by inner regulations, where the staff can recommend the needed materials. There are two main portals used to access the necessary information for the study process.

The teaching staff is elected in accordance with state and university regulations. The stakeholders are informed about available positions. Professional and didactic development is mostly organized by the University of Latvia Academic Department, Adult Pedagogical Education Centre of the UL Faculty of Pedagogy, Psychology, and Art. Other developments are offered by the University of Latvia Faculty of Humanities Centre for Applied Linguistics and help with other projects that help fund courses. The workload of academic staff is balanced, mostly consisting of research activities.

There are support systems in place for students, such as Career consultations and Psychological help. The main building is made accessible for individuals with mobility impairments.

FC has developed very good cooperation with Latvian employers who are generally satisfied with

students' knowledge and skills level and are interested to have more employees from FC graduates and students. FC actively participates in Latvian ICT professional associations. However, the number of partnership agreements with international universities is low. There is a positive trend in the growth of numbers of foreign students coming both for the Erasmus exchange program and the full study programs. It is recommended to review onboarding activities for foreign students in order to ensure their smooth integration into the study process and improve their study experience. The number of international teachers involved in the study process is low.

Overall, the research performed by the staff is sufficient, but students' involvement in the research could be more systematic.

The first-level study programme 'Programming and Computer Network administration'' 41483 is well included in the study field and its title is compliant with the study field. The study programme 'Programming and Computer Network administration'' 41483 delivers a qualification covering and related to the aims, objectives, learning outcomes, and admission requirements. The study programme 'Programming and Computer Network administration'' 41483 is fully justified and aligned with the requirements of the labor market. The practical approach of a first-level study programme 'Programming and Computer Network administration'' 41483, useful content, and effective organizational processes are supported by employers, students, and graduates.
The resources are sufficient for the implementation of the study programme 'Programming and Computer Network administration'' 41483. The finances are balanced. The implementation of the first-level study programme 'Programming and Computer Network administration'' 41483 is ensured by competent academic staff.
The academic bachelor study programme “Computer Science” 43483 is well included in the study field and its title is compliant with the study field. The academic bachelor study programme “Computer Science” 43483 can be delivered in both Latvian and English, targeting international students and a double diploma with the University of Lincoln. The academic bachelor study programme “Computer Science” 43483 delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The academic bachelor study programme “Computer Science” 43483 is fully justified and aligned with the requirements of the labor market.

FC employs a variety of study methods to achieve the academic bachelor study programme “Computer Science” 43483 goals, including lectures, seminars, laboratories, project-based assignments, internships, and independent study. However, the organization of the e-study content differed between the courses, and it was unclear whether guidelines or best practices for creating e-study content existed. A policy for keeping e-study contents up-to-date should be created. The finances for the academic bachelor study programme “Computer Science” 43483 implementation are balanced.
UL sets higher requirements for the personal education level and scientific experience that limits the pool of potential teaching staff. However, only persons with scientific degree PhDs have been elected to pedagogical academic positions in the FC.

The academic master study programme “Computer Science” 45483 fits well the study field and its title is compliant with the study field. The academic master study programme “Computer Science” 45483 can be delivered in Latvian and English, targeting international students. There exists an overlap of the content of separate study courses taught in the academic master study programme “Computer Science” 45483 and the bachelor study programme “Computer science” (code 43483). However, the academic master study programme “Computer Science” 45483 delivers a degree

covering and related to the aims, objectives, learning outcomes, and admission requirements. The academic master study programme “Computer Science” 45483 is fully justified and aligned with the labor market requirements. FC has updated the academic master study programme “Computer Science” 45483 by adding new industry-relevant study courses thus reflecting current ICT sector development trends.
The study provision is sufficient for the implementation of the academic master study program “Computer Science” 45483. The academic master study programme “Computer Science” 45483 has been carried out only by enrolling students in budget-funded places. The finances are balanced, however, there are threats visible in the future if the decreasing trends of enrollment continue.
The implementation of the academic master study programme “Computer Science” 45483 is ensured by competent academic staff.
The Doctoral study programme “Computer Science and Mathematics” 51483 is interdisciplinary, well included in the study field and its title is compliant with the study field. The Doctoral study programme “Computer Science and Mathematics” 51483 can be delivered in both Latvian and English, targeting international students. The Doctoral study programme “Computer Science and Mathematics” 51483 delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. Unfortunately, the cooperation between the subprograms is weak and there is a low thesis yield.

A small number of students have graduated from the Doctoral study programme “Computer Science and Mathematics” 51483 with a Doctoral degree in the last 6 years (25% of those who started studies in the doctoral study programs). A small number of international students enrolled in the program (only two students in the last six years).

The resources are sufficient for the implementation of the doctoral study program. The finances are balanced, however, a mechanism to aid international students to cover their fees is lacking.

The qualification of academic staff involved in the implementation of the current programme complies with the requirements. They actively implement scientific activities. The FC has developed a good culture of internal collaboration in the form of seminars. However, no formal mechanism has been developed for the promotion of mutual cooperation between academic staff.

Overall, the study field is well managed, and supported by the competent administration and teaching staff. Some procedures are still mostly informal, and currently, it works well, however, in the future, it may cause some issues, hence further formalization and digitization of the processes could be useful. The study field is mostly oriented to the Latvian students and staff, and only very reluctantly is looking at internationalization, but taking into account the demographic situation in Latvia speed-up of the process could benefit in the long term.

I - Assessment of the Study Field

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1.1 Management of the Study Field

Analysis

1.1.1. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The main goal of the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science” (study field) is to

1) prepare highly qualified exportable specialists for practical work in companies and state institutions, who would be able to not only design and development complex information systems but also manage projects and independently learn new technologies in a rapidly changing environment across the spectrum of the ICT sector;
2) provide the industry with academically educated specialists prepared for scientific work who would be able to conduct research in computer science and mathematics in Latvia, as well as perform the functions of experts in the evaluation of new technologies and systems and work as university professors.

The study field includes 4 programmes (during the reporting period 3 out of 7 programs were closed):
1. Programming and Computer Network administration, 1st level;
2. Computer Science, academic bachelor;
3. Computer Science, academic master;
4. Computer Science and Mathematics, doctoral studies.

The study field covers all educational levels, from the first to the doctoral programmes. The primary study area is computer science.

The aims of the study field are well-defined.

The study field and the study programs comply with UL strategy (UL Strategy 2021-2027: https://www.lu.lv/fileadmin/user_upload/LU.LV/www.lu.lv/Dokumenti/Dokumenti_LV/1._VISPAREJIE_DOKUMENTI/LU_strategija_buklets_2021.pdf), as well as Latvian and Worldwide development trends and tendencies (2014-2020 and 2021-2027, the European Growth Strategy Europe 2020, the European Sustainable Development to the requirements of the strategy, to the regulations of the Cabinet of Ministers “On priority directions in science in 2018-2021”). Basically, the need for ITC experts and reliance on ITC technologies for development in countries with comparatively low natural resources is widely discussed topics. According to LIKTA, the ITC sector is the third exporting sector, and the need for ITC specialists in Latvia is still unfulfilled (the same, as Worldwide). UL strategy includes a contribution to society and study development, and maintaining and improving ITC programs has a direct impact on these priorities. See SAR (section 1.1, 1.2, 2.1.1).

1.1.2 The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

SWOT analysis was performed. The main strength, weaknesses, opportunities, and threats were identified. As the main strength, highly qualified staff, and flexible and practice-oriented program structure are identified. High dropout rates, insufficient internationalization, and inter-faculty/institute cooperation are identified as the main weaknesses. Most threats are related to unstable funding and demographic factors. Unexpectedly, only a few opportunities are identified, namely cooperation inside the UL as well as external cooperation with other institutions, while potential cooperation with businesses, project-based funding of research and studies programs, and foreign students attraction are missing.

Development plans reflect all the weaknesses and threats identified in the SWOT, however, it would useful to incorporate opportunities into the plans as well.

1.1.3. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment

visit at UL on Feb. 8-9, 2023.

The study field management is shared between the UL Senate, UL Study Programme Quality Assessment Commission, faculty councils, and Council of the Field of Study. Of course, the main management of the study field is shared between

1. Council of the Field of Study (the Council of the Course), which includes the head of the study course, all directors of study programs, students' representatives, representatives of employers, and other relevant experts. The council approves strategy, evaluates and submits new study program concepts to the Study Programme Quality Assessment Commission, evaluates and submits annual reviews to the Faculty council, etc.

2. Head of the Field of Study is responsible for the management and development of the field of study. The head of the Field of Study cooperates with directors of study programs, ensures revision of the programs, and planning of the development.

3. Directors of study programmes are responsible for the separate programmes.

Study field management structure reflects the distribution of responsibilities between different stakeholders. It conforms to a more or less classical approach to the study field and study programs, i.e. from day-to-day decisions by the director of the study program to the whole study field management by the head of the field of study, to the supervisory council of the field of study. Documentation and discussions in assessment visit show that the process is efficient but mostly informal, i.e. often it is based on discussions with the "right" people, for example, the director of the study field, instead of using the procedures. It is not a big problem for those who know the system well, but it can be complicated for new employees, early-stage researchers, and students. A more systematic approach would improve the process even more.

Documentation and discussions in the assessment visit show that the administrative and technical support is sufficient. Recent changes in the study field were performed rather well, the transition is very smooth, and it requires strong support from the UL and FC administration. Comments from the assessment visits of the lecturers and program directors show, that they get sufficient technical and administrative support, i.e. no issues very mentioned, and the procedures are clear.

1.1.4. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The admission process is centralized for UL. Requirements are logical, understandable, and linked to the UL Strategy (https://www.lu.lv/fileadmin/user_upload/LU.LV/www.lu.lv/Dokumenti/Dokumenti_LV/1._VISPAREJIE_DOKUMENTI/LU_strategija_buklets_2021.pdf). The description of the procedure is clear, see section 2.1.4 of SAR, as well as corresponding web pages (https://www.lu.lv/fileadmin/user_upload/LU.LV/www.lu.lv/Dokumenti/Dokumenti_EN/3/26_Enrolment_rules_at_the_UL.pdf). Moreover, all admission procedures are defined in detail and available at UL web pages (https://www.lu.lv/en/admission/admission-procedure/). The applicants who have acquired a Bachelor's degree in a field relevant to the study program are enrolled in the postgraduate study programs. The applicants take part in the competition for budget-funded seats.

Moreover, a system and processes for the recognition of the study period, professional experience, and prior formal and non-formal education are in place. Recognition of previously acquired formal

and non-formal education at UL is defined in the Regulation on recognition of knowledge, skills, and competencies acquired outside of formal education or acquired in professional experience, study results achieved in previous education, and recognition of academic activity at the University of Latvia (UL Senate decision No. 2-3/86 of 28.06.2021) and Regulations on recognizing knowledge, skills, and competences acquired outside of formal education or professional experience and study results achieved in previous education at the University of Latvia (UL order No. 1-4/543 of 04.11.2021). During the reporting period, 1174 students were recognized in the degree program.

The requirements are reviewed and updated yearly, and published on the UL website until the 1st of November (in accordance with Article 46 of the Law on Higher Education Institutions).

1.1.5. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

A set of relevant knowledge, skills, and competencies and their evaluation system, and corresponding learning outcomes are defined for each course separately. Assessment of students' achievements according to the learning outcomes is performed in accordance with the procedure for organizing study course examinations at the University of Latvia (only in Latvian) (UL Senate decision No. 211 of 29.06.2015).

Students are informed about criteria for grading in the study courses, including weights in the final grade, e.g. the total grade of the mid-term tests is not less than 50% of the final grade, and the final test is not less than 10% of the final grade.

Study results and conditions for obtaining a course evaluation are publicly available in the course descriptions and in Moodle, where students receive evaluations of the submitted solutions, comments, and justification for the grade as feedback. Hence they can follow their progress, which learning outcomes, and to what extent they have achieved. It encourages students' understanding and responsibility for their learning, and self-assessment and ensures understanding of the received assessment in accordance with the principles of a student-centered approach. Moreover, the evaluation process takes place throughout the semester, stimulating regular study work.

The methods of the assessment of the achievements of students are similar to other higher education institutions worldwide. From the discussion with lecturers and students it seems that both parties understand them well, and allow them to assess students' results, give them timely feedback, and time to improve it if necessary.

1.1.6. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

Academic Ethics Codex of the University of Latvia (LU Senate decision No. 2-3/46 of 26.04.2021) and the Regulations for academic integrity at the University of Latvia (LU Senate decision No. 2-3/48 of 26.04.2021) provide guidelines for ethical behavior of all the students and employees of the UL. It is accessible to the whole UL community, and the commitment to observe and fulfill the Academic Ethics Codex of the University of Latvia and the Regulations for academic integrity at the University of Latvia is included in every study contract.

Before the test, the teaching staff always reminds students what materials and sources are/are not allowed.

To prevent plagiarism UL uses the Unified computerized plagiarism control system (UL order No. 1/125 of 22.04.2014). It is used to check students' final and doctoral theses. In case of the signs of plagiarism a procedure describing the next steps is defined (Appendix of UL Order No. 1/125 of 22.04.2014; see Appendix II-5).

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions:
The study field is well-founded, management procedures are defined, and the management team is well-qualified and experienced. SWOT analysis is performed and the development plan incorporates its results, but unexpectedly, only a few opportunities are identified, and such opportunities, such as the possibility to get external funding, good demand of Alumni, and influential alumni are missing from the list. Admission and assessment are defined in detail, and well formalized, and all the stakeholders are well informed. A system for plagiarism detection as well as Academic Ethics Codex regulates ethics in the UL.
Overall, the management of the study field is efficient, but in some cases is too informal.

Strengths
1. Clear and consistent structure of the field.
2. Study field management process is efficient.
3. Admission procedures are well-defined, and all the necessary procedures are established.
4. Assessment procedures are well-defined and clearly presented.

Weaknesses:
1. Only a few opportunities are identified in SWAT.
2. Opportunities, identified in SWAT, are not included in the development plans.
3. Study field management process is mostly informal.

1.2. Efficiency of the Internal Quality Assurance System

Analysis

1.2.1. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The quality policy of the UL (as approved by UL Senate Decision No. 78 of January 27, 2020) is publicly available at https://www.lu.lv/fileadmin/user_upload/LU.LV/www.lu.lv/Dokumenti/Dokumenti_EN/2/Kvalitates_politika_majas_lapai_ENG.pdf.

The quality action policy of the UL (as approved by UL Senate Decision No. 1/49 of February 6, 2020) is publicly available at https://www.lu.lv/fileadmin/user_upload/LU.LV/www.lu.lv/Dokumenti/Dokumenti_EN/2/Kvalitates_ricibpolitika_majas_lapai_ENG_new.pdf

The UL has developed and maintains a quality assurance system, as demonstrated by the Quality Management Handbook (The UL Quality Management Handbook ver. 2022, available as Annex I-1.UL Quality management handbook in electronic form). As declared in the introductory part of the Handbook, "The aim of the Quality Management Handbook is to promote the development of quality culture at the University of Latvia by providing information on the implementation of quality

management, involving stakeholders and promoting corporate value creation, responsibility, and reliability."

On the website www.lu.lv/par-mums/dokumenti/pasnovertejuma-zinojumi/ (only in Latvian) one can find the annual self-evaluation reports and reviews of the field of study; the newest report is from the year 2020 (the academic year 2019/2020). The Faculty of Computing (FC) also operates a quality improvement registry (in Latvian, an Excel table available for download, with content largely similar wit Appendix II-20), as explained in SAR pp. 45 and pp. 48; the registry includes entries pertaining to recommendations, and proposal for improving the quality of the study programs, extracted from accreditation recommendations and individual suggestions.

The quality assurance system is designed to cover all components of academic life and is thought to provide the necessary information, such that the development and implementation of the study programs lead to the achievement of their aims and learning outcomes.

1.2.2. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The UL uses a Quality Management Handbook (The UL Quality Management Handbook ver. 2022, available as Annex I-1.UL Quality management handbook in electronic form); the handbook has the goal of " the characterization of UL activities and governance, quality policy and actions, hierarchy of quality management documents and division of responsibilities, defines elements of internal control, as well as describes the UL practice in implementing binding quality standards." The Quality Management Handbook and the related legislation of the UL are fundamental to the way of development and review of study programmes.

As mentioned in SAR pp. 43: "Within the framework of the quality assessment and improvement systems of the degree program and its study programs [...], the development of the degree program and the interconnection of its study programs, creation of new study programs, as well as the results of the implementation of each existing study program are planned, controlled, evaluated and reviewed, ensuring the involvement of the responsible persons of all levels of management of the degree program as well as the representatives of the main stakeholders in ensuring the quality of studies. The review of study programs is regulated by The procedure for preparation of the annual reports of the fields of study at the University of Latvia (UL order No. 1/255 of 13.07.2018)"

Also, SAR pp. 44 describes that: "The development of new study programs is regulated by the Regulation of the study programs and life-long education programs at the University of Latvia (approved by the UL Senate decision No. 102 of 24.04.2017), it is implemented in several stages, including two-fold coordination and evaluation at all administrative levels involved in ensuring the quality of studies – coordinating and approving the study program concept, as well as coordinating and approving the characteristics of the study program at the end of the process."

Responsibilities are clear; SAR pp. 44 explains that „In the process of self-evaluation and evaluation of the development of new study programs, the responsibilities are divided between study program directors, the head of the degree program, Council of the Degree Programme, Faculty Council, Academic Department, and Study Program Quality Assessment Commission, as well as the Senate".

On the website www.lu.lv/par-mums/dokumenti/pasnovertejuma-zinojumi/ (only in Latvian) one can find the annual self-evaluation reports and reviews of the field of study; the newest report is from

the year 2020 (the academic year 2019/2020). The FC also operates a quality improvement registry (in Latvian, an Excel table available for download, with content largely similar wit Appendix II-20), as explained in SAR pp. 45 and pp. 48; the registry includes entries pertaining to recommendations and proposals for improving the quality of the studies programs, extracted from accreditation recommendations and individual suggestions.

Related to the evaluation of new programmes, during the accreditation period the UL started two new programmes in the study field of "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", concerning the doctoral programme “Computer Science and Mathematics”, the bachelor programme “Computer Science” in English and the bachelor programme “Computer Science and Organizational Technologies”.

As explained in SAR pp. 46, “The academic doctoral study program “Computer Science and Mathematics”, by reorganizing (merging) the doctoral study program “Computer Science” and the doctoral program “Mathematics” (license received on September 6, 2021), has been launched. The merging of the programs took place when the University complied with the Ministry of Education and Culture’s decision to reduce the number of study programs implemented in Latvia by a third. Data on this program are included in Section VI and the program is being advanced for accreditation. All students of the previous two doctoral programs “Computer Sciences” and “Mathematics” have been transferred to the reorganized doctoral program “Computer Sciences and Mathematics” from February 2022. The existing programs are ready for elimination.”
As presented in SAR pp. 45-46: „the Faculty of Computing started the implementation of its Bachelor’s program “Computer Science” also in English. The dean conducted negotiations with several UK universities about possible cooperation, which resulted in the agreement signed in May 2021 with the University of Lincoln for the dual award studies.”

As explained in SAR pp. 45, „Academic Bachelor’s study program “Computer Science and Organizational Technologies” (license obtained on April 23, 2019). The program is not being submitted for accreditation. In 2019, a license was received for the undergraduate study program “Computer Science and Organizational Technologies”, which was planned to be conducted jointly with Riga Technical University and the State University of New York at Buffalo. RTU also received a similar license for a program with the same name and similar content.” During the operation of the program it has been found that the program did not attract the planned number of students, and „the faculty has submitted a proposal to the management of the University of Latvia to close the UL study program “Computer Science and Organizational Technologies”. (SAR, pp. 46).

The SAR does not specifically address the feedback from the stakeholders. From the discussions held during the assessment visit within current meetings with various stakeholders, it was concluded that, although feedback is given, the feedback channels and the actual feedback are rather informal or non-documented.

1.2.3.

The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The SAR pp. 46-48 describes the various mechanisms that govern the submission of complaints and suggestions by the students. The expert team’s general impression is that complaints and suggestions are not treated unitarily, and more emphasis and care have been put on managing (registration, solving, feedback) the complaints.

The complaints of the students are administratively divided according to the area of activity targeted. There are several specific areas, related to the stages of the study process: admission, examinations during studies, final examination, and student accommodation.

Concerning student admission, as the SAR presents on pp. 46, “the candidates of the UL have the right to submit complaints to the chairman of the admission commission. The rights of UL candidates to submit complaints about violations in the admission procedure are specified in the Admission rules at the University of Latvia (UL Senate decision No. 2-3/68 of 31.05.2021), which determines the procedure for submitting a complaint, its examination, and appealing the decision.”

Concerning the examinations during studies, as the SAR presents on pp. 46, “students have the right to submit proposals and complaints about the study process, incl. on evaluation of tests and final theses. In order to ensure the quality of the study process, UL has developed and implemented the Order of submitting and examining proposals and complaints of the students (only in Latvian) (UL order No. 1-4/501 of 28.09.2022). The procedure determines in what form students individually or collectively can submit proposals and complaints in writing, as well as the procedure for their registration and evaluation. Proposals and complaints about the study process can be submitted to the deans of the faculties”. The deans report on an annual basis about the received complaints. It should be also noticed that the mentioned procedure is very recent (2022) and no further documentation is given for the handling of such complaints during the accreditation period (2017 – 2022).

Concerning the final examination, as explained in SAR pp. 47, “Regarding the final works, the UL has adopted the Regulation on Graduation Examinations at the University of Latvia (UL Senate decision No. 183 of 27.12.2011), which stipulates that students have the right to file an appeal if the dean has not given them permission to take final exams or about the procedure of the final examination”.

Concerning student accommodation, the SAR pp. 47 mentions that “for those students who use UL students’ dorms, Internal rules of the University of Latvia students’ dorms (UL order of 30.06.2009 No. 1/171; see II-8. appendix) stipulates the rights and obligations of students, incl. the right to file complaints about problems in student dorms.”
Also, regarding remaining ethical aspects of the student life, as the SAR mentions on pp. 47 “Every student has the right not only to use the rights provided for in The Academic Ethics Codex of the University of Latvia (UL Senate decision No. 2-3/46 of 26.04.2021) to appeal to the Academic Ethics Commission of the UL for possible ethical violations but also to submit proposals for the improvement of the code and its implementation to the Academic Ethics Commission of the UL.”

The management of student suggestions is not precisely regulated at the university level since no dedicated procedure or process is mentioned. From that point of view, the FC sets an example of good practice by the implementation of the quality improvement registry (in Latvian, excel table available for download, with content largely similar to Appendix II-20), as explained in SAR pp. 48. As explained in the web pages addressed to students in Latvian only (https://www.df.lu.lv/studijas/lidzdarbiba-studiju-kvalitates-uzlabosana/), the FC invites suggestions of quality improvement from students to be included (via the Dean’s office) in the quality improvement registry. The registry contains various improvement suggestions extracted from the accreditation and program license recommendations, as well as a few genuine student-originated suggestions (improvement of orientation indicators in one building, use of a specific, interactive audio technology in auditoriums, etc).

Even so, there is no underlying procedure for the managing of the register, this being operated more

as a “de facto” process (one should note that here the meaning of “de facto” correlates well with the discussions held during assessment visit meetings with various stakeholders at Riga, on 8-9 February 2022, concluding that there is no “de jure” procedural approach i.e. written procedures and implementation tools).

The discussions held during assessment visit meetings with students of the study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" at Riga, resulted that, although feedback is given, the feedback channels and the actual feedback are rather informal or non-documented.

1.2.4. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The SAR describes on pages 48-51 the data and the statistics that the University of Latvia uses in order to monitor and assess the effectiveness and quality of the study programs. The acquired data can be seen as being part of three main categories: university management data, student satisfaction data, and employer satisfaction data.
The university management data collected and analyzed is, expectedly, related to the number of students, their breakdown on faculties and study programs, financing, credit debt and scholar fee debt, and grants given or received (as described in SAR pp. 48-49).

The student satisfaction data is described in SAR pp. 49-50 and it consists of several surveys. First, “survey at the start of studies (see example in Appendix II-24), which is carried out electronically once a year. The objective of the survey is to obtain information for the improvement of student attraction measures.” A specific survey is then performed after the first year of studies, “survey of students of the first year of studies about their study experience (see example in Appendix II-25), which is also carried out electronically once a year. The purpose of the survey is to obtain information for improving the study environment and promoting student adaptation”.

During the studies, there are regular surveys regarding the courses (Appendix II-26), the internship (Appendix II-30), about the final work (Appendix II-29). All these surveys are mandatory for the students of the FC, such that the amount of gathered data is relevant.

At the end of the studies, as SAR pp. 49-50 shows that another survey is performed, “in order to obtain students’ evaluation of the study program for its further development, improvement of the study process, improvement of quality and study environment, the survey of 50 students of the last study year about the overall study program (for example, see Appendix II-27) is carried out.” Also, as mentioned in SAR pp. 50 „graduate surveys aim at obtaining an assessment of the graduates’ satisfaction regarding the quality of the studied program, knowledge, skills and competences acquired at the UL, the contribution of the completed study program to their employment, as well as plans to continue their studies. The survey is conducted by program’s directors at their discretion using a survey questionnaire prepared by the Academic Department”. This description seems to indicate that there is a certain overlap between the surveys performed at graduation.

Finally, the employers are also surveyed; as SAR pp. 50 explains: „employer surveys (see Appendix II-10) the aim of which is to find out how employers assess the compliance of the knowledge, skills, and competences acquired by the graduates of the University of Latvia with the requirements of the labor market. The survey is conducted by program’s directors at their discretion using a survey questionnaire prepared by the Academic Department.”

There is also a parallel, independent employer survey realized by the Confederation of Employers of Latvia (https://www.prakse.lv/top (only in Latvian)) which is used by the FC.

The discussions held during the assessment visit meetings with students, graduates, and employers of the study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", resulted that, although feedback is given, the feedback channels and the actual feedback are rather informal or non-documented.

The UL Quality Management Handbook ver. 2022, available as Annex I-1.UL Quality management handbook in electronic form mentions (Table 3.1, pp. 60) that Alumni employment and overall satisfaction are the responsibility of the Study program director and of the Head of the Study Field, with the support of the Academic Department.
Still, all the employment surveys presented are issued by the Rectorate of the University or the Ministry. Experts presume that the gathering of true meaningful employment data over time (in order to monitor the career of the graduates) is a task well beyond the implementation means of the director of a study program and a higher, more official instance should be involved.

1.2.5. The analysis is based on SAR (section 1 and section 2.1) and meetings during the assessment visit at UL on Feb. 8-9, 2023.

The SAR presents on pp. 51-53 the contents of the website of the University of Latvia and the FC. As mentioned in the SAR p. 51 “UL website’s https://www.lu.lv/en/ [..] target audience is prospective and current students, employees, cooperation partners, scientists, and the general public. The website is designed to provide availability and storage of public information, an opportunity for its visitors to familiarize themselves with information about the activities of the UL in digital form in the Internet environment.”

Also, SAR pp. 52 mentions that “The information is prepared and posted on the website by the Department of Communications and Innovation in cooperation with the Academic Department and the Student Service Department. In the STUDIES section, in Latvian, you can find information about program objectives, tasks, learning outcomes, program scope and duration, program study language, information about job opportunities after graduation, as well as program study plans. In case of questions, contact information is provided for further information. Moreover, in this section one can find useful information for studies published under the subsection STUDY GUIDE – academic calendar, lists of lectures, consultation times, the most important documents and sample forms, information on mobility opportunities in foreign universities, on recognition of experience/education, lifelong learning opportunities, as well as directions to UL e -study website and LUIS information system.” And „ADMISSION section contains information for both prospective and current students. In this section, high school students can familiarize themselves with events and creative competitions organized by the FC, in which it is possible to get additional points for admission by participating and successfully starting. For those who want to study, the website publishes information about programs of all levels, their admission requirements, information about loans and scholarships, as well as the possibility of resuming studies. Prospective students can obtain information about the most frequently asked questions and answers, get information about the activities of the Career Centre, preparatory courses and classes for high school students.”

On the website www.lu.lv/par-mums/dokumenti/pasnovertejuma-zinojumi/ (only in Latvian) one can find the annual self-evaluation reports and reviews of the field of study; the newest report is from the year 2020 (the academic year 2019/2020).

The FC operates its own website (https://www.df.lu.lv/), with a similar visual appearance and content as the university. All important content is available also in English. The SAR pp. 53 mentions clear responsibilities regarding the uploading of web content on the site: “Heads of UL structural units are responsible for preparing information on the website within the competence of their structural units, its correctness, and updating. The content administrators of the structural units’ websites are responsible for maintaining the website, posting information, and updating it on a regular basis. The FC marketing specialist is responsible for posting content about the Faculty of Computing.”

The overall English language documentation is rather explanatory and complete; all English-language programmes from the FC are correctly described. The Latvian version of the site is complete; all programmes are correctly described.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions:
The UL has a public policy of quality and has implemented means for its implementation. The study programmes are developed and evaluated according to procedures. The UL/FC manages the process of student complaints. The UL/FC gathers and analyses data regarding the students, their studies, and the effectiveness of the processes. The UL/FC provides public information about the programs via its websites; the information is correct and sufficient for the information about the programmes, in their language of implementation. The feedback channels and the actual feedback given to various stakeholders (students, graduates, employers) are rather informal or non-documented. The employment data gathering is not sufficiently procedure and there are doubts that the people in charge have the means of efficiently performing that task.

Strengths
1. The UL established a policy for quality assurance and a quality assurance system that is in place.
2. The elements for submission of student complaints and suggestions are in place and students can give comments and suggestions.
3. The data collection mechanism for the purpose of quality assurance is established.

Weaknesses
1. Feedback to stakeholders (students, graduates, employers) is mostly informal and undocumented.
2. The Head of the Study Field is tasked with gathering employment data on graduates, but no specific means and procedures are established for this purpose.

Assessment of the requirement [1]

1 R1 - Pursuant to Section 5, Paragraph 2.1 of the Law on Higher Education Institutions, the higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system:

Assessment of compliance: Fully compliant

The UL complies with all the requirements of the criteria since it ensures continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system, as justified in the sub-criteria below. Improvements can still be made in the way of conducting graduate employment surveys and in the documentation of the feedback to stakeholders.

2 1.1 - The higher education institution/ college has established a policy and procedures for assuring the quality of higher education.

Assessment of compliance: Fully compliant

The quality policy of the UL was approved by UL Senate Decision No. 78 of January 27, 2020; the quality action policy of the UL was approved by UL Senate Decision No. 1/49 of February 6, 2020; both are publicly available.

3 1.2 - A mechanism for the development and internal approval of the study programmes of the higher education institution/ college, as well as the supervision of their performance and periodic inspection thereof has been developed.

Assessment of compliance: Fully compliant

The UL uses a Quality Management Handbook which includes procedures (approved by the Senate of the University of Latvia) for the development and approval of study programmes.

4 1.3 - The criteria, conditions, and procedures for the evaluation of students' results, which enable reassurance of the achievement of the intended learning outcomes, have been developed and published.

Assessment of compliance: Fully compliant

The UL has developed and implemented the Order of submitting and examining proposals and complaints of the students (only in Latvian) (UL order No. 1-4/501 of 28.09.2022) that describes criteria, conditions, and procedures for the evaluation of students' results.

5 1.4 - Internal procedures and mechanisms for assuring the qualifications of the academic staff and the work quality have been developed.

Assessment of compliance: Fully compliant

The UL has developed and implemented the "University of Latvia Human Resource Management Policy" and The UL Quality Management Handbook ver. 2022, covering academic staff and work quality assurance.

6 1.5 - The higher education institution/ college ensures the collection and analysis of the information on the study achievements of the students, employment of the graduates, satisfaction of the students with the study programme, efficiency of the work of the academic staff, the study funds available and the disbursements thereof, as well as the key performance indicators of the higher education institution/ college.

Assessment of compliance: Fully compliant

The UL acquires data in three main categories: university management data, student satisfaction data, and employer satisfaction data; the data and the statistics derived from it ensure the evaluation of key performance indicators and quality indicators related to study programs. The collection of employment data is not sufficiently regulated by procedures and means to effectively obtain data.

7 1.6 - The higher education institution/ college ensures continuous improvement, development, and efficient performance of the study field whilst implementing its quality assurance systems.

Assessment of compliance: Fully compliant

The FC sets an example of good practice through the implementation of the quality improvement registry (in Latvian, Excel table available for download). The registry contains various improvement suggestions extracted from the accreditation and program license recommendations, as well as a few genuine student-originated suggestions (improvement of

orientation indicators in one building, use of a specific, interactive audio technology in auditoriums, etc); all suggestions and recommendations have implementation deadline and status and a responsible person.

1.3. Resources and Provision of the Study Field

Analysis

1.3.1.
The UL's system for financing the study field of Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science (study field), and corresponding study programmes are built based on the Law on Higher Education Institutions, Regulations of the Cabinet of Ministers No. 994 of 12.12.2006 “Procedure in which universities and colleges are financed from state budget funds”, Regulations of the Cabinet of Ministers No 445 of 05.07.2016 “Regulations on teachers’ remuneration” and other external and internal regulations.

Funds for the organization of the study field are made from the state budget grant (considering the basic funding determined by the Ministry of Education, the level of the programme, and the field of study) from the Ministry of Education and Science, and tuition fees. Income from lifelong learning or other services, as well as the accumulated financial resources of the structural unit, can also be used for the development of the study field (development of new courses, improvement of existing ones, improvement of methodological support, and development of other aspects of the program). If necessary, financial support can be received from the UL study quality improvement fund, where an amount is reserved in the UL budget every year for solving various issues of the faculties, including the development of new study 55 programs and the development of existing study programs. (SAR p.54)

Also, the resources of scientific funding aid the development of the study field, for example, purchasing new equipment, publishing articles, doctoral student involvement, etc. (SAR p.54) During the assessment visit, it was established from the doctoral level study program “Computer Science and Mathematics” (51483) students that almost all students are employed in some of the research projects, f.e., Quantum Algorithms: From Complexity Theory to Experiment and Modeling multilingual human-computer communication using artificial intelligence techniques.

State budget funding for research is around 140 thousand Euros per year (around 2.8 thousand per teaching staff elected to an academic position). On average, around 750,000 Euro per year (around 30,000 Euro per teaching staff elected to an academic position) are obtained in European or national level competitions. The most significant part of this funding is attributed to the field of theoretical quantum computing, where it supports the study of discrete mathematics, however, there are projects related to IT, computational linguistics, and cognitive sciences. Within the study field, there is a system for financing research that has been defined and implemented and it is effective:

1. the funding of research and development projects, after deducting a certain part from the University of Latvia and the Faculty of Computing (usually 5% and 5%), goes to the project manager, who uses it for the remuneration of the project participants, purchase of materials, hardware, and software necessary for the project

2. up to 200 hours per year from the funding of the state study base are paid to an elected faculty member for scientific publications in publications indexed by Web of Science or SCOPUS;

3. a certain part of the base funding of the national science budget determined by the Faculty

Council is paid to elected academic staff for scientific publications in publications indexed by Web of Science or SCOPUS. (SAR p.55)
From all the income there are calculated indirect expenses, which are deducted by the current redistribution procedure. Within the framework of the current year's budget, the faculties use the received funding independently. The dean and executive director of the faculty, who perform operational financial management, are responsible for the rational use of financial resources. The accounting of the actual profitability at the faculty level takes place without separating the results of each program or specific degree program, however, dynamics of the number of students and the factors affecting them, the balance of the actual cost of the specific program with the state budget grant and tuition fees are taken in mind. (SAR p.55)

During the assessment visit, in the meeting with academic staff and students from doctoral studies, it was confirmed that funding for research is available, mostly by European and National grants, that also allows the purchase of the needed equipment.

1.3.2.
The study programs of the FC of the UL are implemented on the premises of the University of Latvia at Raiņa Bulvāris 19 and at the University of Latvia – Institute of Mathematics and Computer Science at Raiņa Bulvāris 29, as well as on a very limited scale – at the University Academic Centre at Jelgavas Street 1 and 3. At the main premises, there are available larger auditoriums (up to 130 places), 3 seminar rooms, 4 computer classes (20-25 places), a Linux center (20 places), and "DF LAB", which serves as a more "creative space" for students to work on their practical works/thesis, etc. There are available 3D printers, Speedy 400 laser cutters, soldering stations, and others. Auditoriums, seminar rooms, and computer classrooms are fully equipped with projectors, portable computers, desktop computers, wireless Internet, sound system, and electricity connection points for student workplaces (partially).

To ensure the study process, the FC uses the following software in computer classrooms: MS Office, MS Teams, Android Studio, Python, Eclipse, Codeblocks, and ADOBE Creative Suite. The Linux center or laboratory was specially created for the study process, where students use MikroTik, Cisco, and HP network devices (managed switches, routers) in the laboratory and practical work to learn their use and control. The Linux lab hosts several Dell, Supermicro, and HP servers. In addition to the servers in the Linux laboratory, the following servers are also available at the Faculty of Computing: SQL Database server used in study courses and SuperMicro R422BG – 22 Superserver with five Tesla V100 cards used for machine learning purposes.

A uniform system and procedures for the development and purchase of facilities and aids, methodical materials, and information:

1. the necessary study literature is ordered by the lecturer of the relevant study course through LUIS, but funding for purchase from centralized or faculty funds is approved by the dean, vice-dean or executive director,

2. within the scope of the project funds required in the research project the project manager orders the necessary aids for the executive director,

3. In other cases, any employee can initiate the necessary purchase for the executive director, but the decision is made by the executive director in communication with the dean. (SAR p.56-57)

In the assessment visit meeting with academic staff, it was discussed that mostly the larger

equipment is purchased within research projects. During the library visit, it was confirmed that docents can order new literature resources at any time with approval from the dean. In all the meetings with student groups, it was identified that the material-technical basis is sufficient and fulfills the need to implement the study programs, therefore the resources are available to students and teaching staff.

1.3.3.
The services are provided in 8 branch libraries of the University of Latvia Library. The premises of the library on Raina Boulevard, which houses the information technology, computer engineering, electronics, telecommunications, computer control, and computer science industry collection, are open to students at a convenient time 68 hours a week. An open-access repository is available to users. The library on Raiņa Bulvāris is located in 7 rooms, which also provides study spaces for group and individual work - 120 workplaces + 18 workplaces for working with a computer.

According to the data as of October 1, 2021, the literature available in the collection of the University of Latvia Library of the degree program “Information technologies, computer engineering, electronics, telecommunications, computer management, and computer science” includes 5,737 titles of printed information resources in 13,584 copies, mostly in English, Russian and Latvian. (SAR p.59) In the meeting with the library staff, it was mentioned that most resources are provided in electronic format as well. When purchasing new literature materials, ebooks get the upper hand. It was also confirmed that the academic staff can request new literature materials throughout the year (has to be approved by the dean). There is no system on how students can suggest the purchase of new materials directly, however, it can be suggested to the responsible course leader and then purchased in the previously mentioned manner.

The University of Latvia Library, in cooperation with the University of Latvia Information Technology Department, provides visitors with free online access to the University of Latvia e-resources repository http://dspace.lu.lv. Currently, the e-resources repository contains more than 2,684 publications relevant to the UL degree program “Information technology”. (SAR p.59) There are available 42 e-resources platforms (both ebooks and e-journals). All e-resources can be seen on their webpage (https://www.biblioteka.lu.lv/resursi/e-resursi-no-a-lidz-z/)

During the assessment visit, in the meeting with students, it was discussed that mostly the needed materials are available on e-studies for the relevant courses. The experts believe that the methodological and informative provision is sufficient.

1.3.4.
There are two e-studies environments available – estudijas.lu.lv and edu.lu.lv. The e-studies environment estudijas.lu.lv is designed to ensure and manage the study process, and the e-learning platform edu.lu.lv is designed for e-learning projects, events, and courses. These systems allow students to access all the needed materials for studies and participate in tests etc. Grading is also available on the mentioned platforms.

The University of Latvia students and employees are provided with the MS Office 365 software package, which is a cloud-based technological solution. Office 365 provides students and employees with the best tools for modern studies, such as Outlook, Forms, OneNote, and Sway, as well as the Office package, which includes Word, Excel, and Powerpoint programs. In addition to MS Office 365, UL students and employees are provided with software such as SPSS, Question Pro, Autodesk, MathWorks Matlab, Esri ArcGIS, etc. Microsoft teams are used to ensure the remote study process, as well as the information system BigBlueButton that allows the organization of online events. (SAR

p.60)

In the assessment visit meeting with the students and graduates, it was mentioned that more video lectures should be recorded and made available to students to watch at their convenient time. The academic staff pointed out that it depends on their own experience on how to hold the lecture (on-site or online).

1.3.5.
For the elected academic positions, as well as those who perform their responsibilities, the selection and recruitment are carried out according to the "Regulations on academic and administrative positions at the University of Latvia" https://www.lu.lv/fileadmin/user_upload/LU.LV/www.lu.lv/Dokumenti/Dokumenti_LV/5._DAZADI/SL_2-3-11-2022__Nolikums_par_akad_l__1_.pdf). Competitions for elected academic positions are announced openly on the UL website, as well as in the official publication "Latvijas Vēstnesis". Any person who meets the requirements of the Law on Higher Education Institutions can apply for the competition.

Applicants are evaluated by two reviewers while conducting an open lecture, then the selection is held by the decision-making body of the responsible structural unit (in the case of assistants, research assistants, researchers, leading researchers, lecturers, and teachers – by the faculty council and in the case of associate professors and professors – by the council of professors of the corresponding field). (SAR p.61)

During the assessment visit, it was asked the stakeholders of their knowledge of attracting new academic staff, and all parties were informed. The experts believe that UL is open to attracting new teachers and stakeholders are informed about the possibilities.

1.3.6.
The professional development of the academic staff of the University of Latvia is organized by the Regulations of the Cabinet of Ministers of the Republic of Latvia No. 569 of 11.09.2018 "Regulations on Necessary Teacher Education, and Professional Qualifications, and Procedure for the Improvement of Professional Competences". Professional development activities are included in the Academic Staff Development Activities Plan of the University of Latvia for 2018-2023 (Appendix II-22).

University of Latvia Academic Department, Adult Pedagogical Education Centre of the University of Latvia Faculty of Pedagogy, Psychology, and Art provides informative, consultative, and methodical support to the University of Latvia lecturers in the field of university didactics daily. The University of Latvia academic staff can supplement their English language skills in the further training program of the University of Latvia Faculty of Humanities Centre for Applied Linguistics. There is a course for young lecturers "Introduction to the work of a lecturer" every spring semester. Other specific courses are provided for academic staff's development.

With the funding of the European Union several training programs for lecturers, such as online learning development and digitization of learning content, innovations for improving the quality of the learning process, and academic honesty. In the reporting period, within ESF project SAM 8.2.2 at the FC there is noticeable participation from academic staff, f.e., 20 teaching staff members have improved their English language skills, and three lecturers from foreign universities (Lithuania, Sweden, and Turkey) worked in the degree program and at the end of the reporting period are in working relations with the University of Latvia in the positions of visiting professor, visiting associate

professor and elected associate professor, respectively (the arrival of 3 more visiting lecturers is expected in the autumn semester of 2022), 4 teaching staff members have completed scientific publication skills training.

The Department of Studies of the University of Latvia conducted an electronic survey of the University of Latvia academic staff to understand what professional development training should be offered. After the implementation of each course, a survey of its participants and an evaluation of the results (SAR p. 64-65).

In the assessment visit meeting with academic staff, it was noted that participants have taken part in development courses and many use the courses provided by Stanford University, which takes more focus on how to teach STEM subjects better.

1.3.7.
Every FC teaching staff member can agree with the dean on full-time or part-time work, also determining the proportions of the teaching and research workload. In the assessment visit meeting with the management, it was confirmed that most teachers provide 1-3 study courses and the workload can be balanced between research or workload in the industry.

The Dean and Vice–Dean have the largest administrative workload (0.5). The administrative workload of the program directors reaches 0.3 and is compatible with the tasks of a lecturer and researcher. Most of the teaching staff are mainly employed in teaching, the workload mainly consists of classes, students tests, consultations, improvement of study courses, and participation in the supervision of the thesis. FC members usually are additionally elected to a scientific position as leading researchers or researchers. The intended tasks of teaching and research work shall be balanced and form a positive link between teaching and research in the work of lecturers (SAR p. 67).

1.3.8.
The UL provides academic support, career development support, and psychological support for students.

Academic support is provided by the University of Latvia Study Service Department and the responsible persons in the faculties: the study program director, curator, mentor, desk clerk, study course lecturers, as well as the Student Council and student self-government of the FC. There is also a mentor program provided, where students can receive help from an older student in the same study program. Consultations on the use of library and Internet resources are provided by the University of Latvia Library. (SAR p.68) During the assessment visit, during the tour of the library, it was also mentioned that there are various study courses, where students can acquire more information on how to use the needed resources, f.e., on e-resources, and citations. All courses for students can be seen online https://www.biblioteka.lu.lv/macibas/nodarbibu-piedavajums-studentiem/.

Career development support is provided by the Career Centre of the University of Latvia Study Service Department in cooperation with the faculties. The Career Centre provides students with individual counseling, seminars on the development of career planning skills, and internet resources – Career Centre website (information available in both Latvian and English) https://www.karjera.lu.lv/ and https://www.karjera.lu.lv/eng/, where there can be found information about internships and job opportunities. Psychological support is provided by the Study Service Department. A psychologist consultant provides individual consultations for students.

In cooperation with the “Apeirons” association, an infrastructure survey has been carried out on the accessibility for persons with disabilities. The obtained results are considered both in the construction of the new infrastructure and in the creation of facilities for study programs. The building has a built-in elevator up to the 3rd floor, which allows access to study spaces for persons with mobility impairments. (SAR p.69) In the tour of the facilities, it was shown that the needed facilities are accessible with mobility impairments, as well it was mentioned that there have been students with visual impairments that also could successfully finish their studies. The specific aids on the needed course are discussed with the relevant teacher and made if needed.

There are available scholarships both from the government (universally regulated for government-funded budget places) and many options provided by employers and mecenati. (From meeting with the students) In the meeting with employers, all participants provided the information that internships are paid which is an important aid for students to successfully continue their studies.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions:
The financial support is planned and overlooked locally by the FC and allows study field development. Funding for research is available, and a fair amount of funding is brought into the field from research projects where students of the field are involved.

The infrastructure of UL is sufficient and offers the needed equipment. Methodological and informative provision is met by the library, which offers both physical books and e-resources. Replenishing the collection is regulated by inner regulations, where the staff can recommend the needed materials. There are two main portals used to access the necessary information for the study process.

The teaching staff is elected in accordance with state and university regulations. The stakeholders are informed about available positions. Professional and didactic development is mostly organized by the University of Latvia Academic Department, Adult Pedagogical Education Centre of the UL Faculty of Pedagogy, Psychology, and Art. Other developments are offered by the University of Latvia Faculty of Humanities Centre for Applied Linguistics and help with other projects that help fund courses. The workload of academic staff is balanced, mostly consisting of research activities.

There are support systems in place for students, such as Career consultations and Psychological help. The main building is made accessible for individuals with mobility impairments.

Strengths
1. The library has sufficient methodological materials that are replenished regularly.
2. There are national and international projects available for research funding.
3. “DF LAB” project studio is available for students to work on their various types of practical research and laboratory work during or outside of their studies.
4. The academic staff can order the needed materials and resources at any moment of the semester.
5. The employers are interested to participate in the study process either via employing students during their internship or participating with guest lectures.
6. The internship places are mostly paid.

Weaknesses:
1. Not all lectures are recorded

1.4. Scientific Research and Artistic Creation

Analysis

1.4.1. The analysis is based on SAR (section 1 and section 2.1) and meetings during the visit at UL on Feb. 8-9, 2023.

The scientific research and applied research of the study field correspond to the goals of the UL, namely the “Innovative information technologies” line of research. Moreover, it is relevant for the study field as well as the IT industry.

The teaching staff of the study programme performs research in the FC, as well as the UL Institute of Mathematics and Computer Science, and the Institute of Electronics and Computer Science.

The corresponding doctoral programme is mainly supported by the research in the faculty and both above-mentioned institutes.

All the staff follows the Regulation of the Council of Ministers No. 129 (February 25, 2021) “Procedure for evaluating the scientific and pedagogical qualifications or artistic creative work results of an applicant for the position of professor or associate professor and an existing professor or associate professor.”

1.4.2. The analysis is based on SAR (section 1 and section 2.1) and meetings during the visit at UL on Feb. 8-9, 2023.

Research results of the leading researchers are implemented in the study programs, e.g. Quantum algorithms courses. Studies and research are well connected at all levels, due to the fact that most of the full-time faculty teach at all levels.

A number of students are involved in the research projects as well, e.g. SAR mentions, that 14% of the faculty employees were students at the time of SAR preparation.

However, as follows from the discussion with students, only selected students are invited to participate in the research, and research projects are not discussed with students.

1.4.3. The analysis is based on SAR (section 1 and section 2.1) and meetings during the visit at UL on Feb. 8-9, 2023.

The staff of the study field is quite actively cooperating with international partners. The most impressive are the results Center for Quantum Computing Science led by Andris Ambainis. They cooperate with a number of different research institutions, such as the Centre for Quantum Software “QuSoft” in Amsterdam, The Netherlands, the Paris Centre for Quantum Computing, the Free University of Brussels, and much more.

The staff of the study field jointly with partners organize the DB&IS conference, MMA (Mathematical Modelling and Analysis), and publish the “Baltic Journal of Modern Computing”. A number of workshops were organized jointly with Riga Stradiņš University with the participation of internationally renowned scientists.

Academic mobility opportunities are used by the staff as well, in SAR cooperation with the University

of Ostrava, Slovak University of Technology in Bratislava, and the University of Balearic Islands are mentioned. However, the academic mobility of staff is still pretty low.

Doctoral students are involved in the activities of international organizations, such as the EURO (European Operational Research Society), EUSFLAT (European Society for Fuzzy Logic and Technology), and others.

1.4.4. The analysis is based on SAR (section 1 and section 2.1) and meetings during the visit at UL on Feb. 8-9, 2023.

The main mechanism to involve teaching staff in research is the following:

1. All the staff should publish a certain minimal amount of papers in journals, indexed b Scopus or Web of Science (Clarivate), hence to keep the position staff should continuously perform research and publish.

2. Participation in the projects means additional remuneration, and taking into account the salaries of the teaching staff, it is a very strong motivator.

During the 2019 international evaluation of the scientific institutions the Faculty of Computer Science (as a part of the UL Natural Science Cluster) received an evaluation of 3 out of 5 (4/ for the scientific quality), while the UL Institute of Mathematics and Informatics was evaluated 3 and the Institute of Electronics and Computer Science was evaluated 4.

The teaching staff of the faculty published over 500 papers indexed in Scopus and WoS from 2016 to 2021. However, the number of such publications is decreasing, which is slightly worrying, and requires deeper analysis.

Participation in international projects remains stable, while in local projects it slightly decreased. Participation in the conferences has decreased, but potentially the reason is COVID-19.

1.4.5. The analysis is based on SAR (section 1 and section 2.1) and meetings during the visit at UL on Feb. 8-9, 2023.

Bachelor and master students mostly participate in the research as a part of their final projects. Moreover, in some courses, such as “Quantum algorithms”, "Visual Perception: Methodologies, Frameworks”, lecturers include the newest research results. The so-called Excellence studies also provide the students an opportunity to participate in the research.

Ph.D. students perform research themselves as a part of the study programme.

Selected students are invited to participate in the research projects, but it is done on a personal basis, i.e. it is not discussed with all the students, and students are not informed about the research performed in the faculty, and opportunities to join the research teams. It is not a big problem in the case of bachelor students, but master's and especially doctoral students should be informed about the possibility to join research groups, participate in research projects, get additional funding for the research.
During the assessment visit meeting with alumni, it was strongly stated that foreign Ph.D. students have problems getting involved in projects and other faculty activities.

1.4.6. The analysis is based on SAR (section 1 and section 2.1) and meetings during the visit at UL on Feb. 8-9, 2023.

The study field implements so-called Excellence studies, which allow talented students to personalize their study path, and participate in additional study and research activities. Undergraduate and graduate students can join the excellence studies, where they can:
1. In agreement with the lecturer have the course adapted to the student's path, making it more in-depth, than for the regular students.
2. Participate in special seminars.
3. Engaging in scientific projects with lecturers and IT experts (mentors).

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
Research of the academic staff of the study field corresponds to UL and Latvia’s goals. Applied research is of interest to the industry as well. The staff is assessed as required by Latvian regulations. Selected students are involved in research, but some of them are not informed about the possibility to perform research, and moreover, some Ph.D. students, especially foreign ones, are not invited to join the projects or perform other duties at the faculty. The teaching staff is quite active internationally, especially in Quantum Computing, and language technology research. The teaching staff publishes quite a lot, however, the number of publications indexed in Scopus and WoS is decreasing. The project-wise situation is good. Excellence studies allow students to personalize their studies path and participate in additional educational and research activities.

Overall, the research performed by the staff is sufficient, but students' involvement in the research could be more systematic.

Strengths
1. Research of the academic staff of the study field research conforms to the UL priorities.
2. Quantum Computing and Language Technologies researchers are quite active internationally.
3. The number of international projects is quite high and remains stable.
4. Excellence studies allow students to personalize their studies path and participate in a number of interesting and involving activities.

Weaknesses:
1. Only selected students are invited to participate in research, i.e. it is not done systematically, and not all of them know, how to join research projects and teams.
2. Foreign Ph.D. students are not involved in research projects or other faculty activities.
3. Number of publications indexed in Scopus and WoS is decreasing.

Assessment of the requirement [2]

1 R2 - Compliance of scientific research and artistic creation with the level of development of scientific research and artistic creation (if applicable)

Assessment of compliance: Fully compliant

Relevant research is performed by the studies programmes teaching staff, and student's involvement in research is sufficient. However, the number of publications indexed in Scopus and WoS is decreasing. There are no systematic mechanisms for bachelor and master-level students' involvement in the research. Even though experts identified some weaknesses, they are only for improvement, and doesn't affect evaluation.

1.5. Cooperation and Internationalisation

Analysis

1.5.1. The cooperation partners suitable for the study programs or/and the FC research directions are selected based on several aspects, including such aspects as previous successful cooperation experience, the partner's relevance to the FC research directions or/and study programs' directions, mutual interest in forming sustainable cooperation, the partner's research or academic qualifications (SAR, p. 78).

UL is a member of the leading Latvian Information and Communication Technology (ICT) professional associations and clusters:
1. Latvian Information and Communication Technology Association (LIKTA, https://likta.lv/en/members-and-partners/),
2. Latvian Open Technology Association (LATA, https://www.lata.org.lv/biedri?lang=en),
3. Latvian IT Cluster (https://www.itbaltic.com/members)

Leading ICT companies and education institutions in Latvia are members of the associations listed above. The FC actively participates in workgroups of ICT associations, conferences, and joint projects thus sharing opinions, experience, and ideas and giving/receiving feedback on the ICT sector development in Latvia and the needs of the ICT labor market (SAR, p.78; input from meeting with employers). As result, these activities contribute to the achievement of the aims and learning outcomes of the study field and the relevant study programs.

Professors and researchers of FC participate in annual conferences and discussions organized by these associations (https://www.lata.org.lv/konference-2022, https://www.lata.org.lv/konference-2021, https://likta.lv/datorikas-skolotaju-konference/).

The University of Latvia is one of the founding partners of the IT competence center and actively participates in joint research projects with industry partners (https://www.itkc.lv/#Dibinataji).

FC together with the University of Latvia Institute of Mathematics and Computer Science, University of Agriculture of Latvia, University of Liepāja, and Vidzeme University of Applied Sciences is a co-publisher of an open-access electronic journal Baltic Journal of Modern Computing https://www.bjmc.lu.lv/en/, which is indexed in Web of Science and SCOPUS. It is a very important factor for Doctoral program students when they publish their research results.
All students of the study program ''Programming and computer network administration '' (41483) go to a mandatory 18-week internship in industrial companies. FC organizes support for students to find internship places. FC has 396 cooperation agreements signed with companies and other institutions which are interested in participating in an internship (Annex II-19 of Self-assessment report).

There are regular surveys conducted by FC to receive feedback from employers regarding students' skills and employers' expectations (Annex II-10 of Self-assessment Report).

Results of surveys and meetings in assessment visits with employers confirm that cooperation with ICT sector companies is at a good level. The main concern of employers is an insufficient number of FC graduates (input from meetings with employers).

1.5.2. The foreign cooperation partners suitable for the degree program and study programs are selected based on several aspects, including such factors as previous successful cooperation experience, the partner's suitability to any of the academic or research directions or/and the study

programs directions, mutual interest in forming sustainable cooperation, the partner's research or academic qualifications (SAR, p.80).

FC cooperates with some academic and research institutions in Latvia and abroad. However, the number of international partners seems very low. Currently, there are only three cooperation agreements with academic institutions abroad (Annex II-19, Self-assessment report pp 80-81):
1. University of Lincoln, UK for providing Dual diploma studies in the bachelor program; the agreement is signed in 2021; the first 6 students started their study;
2. The Almaty University of Power Engineering and Telecommunications, Kazakhstan for exchange of students and staff, development of joint study courses;
3. Plekhanov Russian University of Economics for Exchange of students and staff.

An agreement with the University of Lincoln on the dual award studies (SAR, p.81) positively contributes to the achievement of aims and learning outcomes of the bachelor study program in "Computer Science" 43483.

There are significantly more project-based international activities mostly related to the Doctoral study program Computer Science and Mathematics (51483), specifically quantum computing and language technologies. There are several joint international research projects which are going on in these scientific areas (Self-Assessment report, pages 80-81). In the scope of these projects, FC is involved in joint research activities with several EU countries' research institutions. Participation in these projects contributes to the achievement of the aims and learning outcomes of the Doctoral study program Computer Science and Mathematics (51483).

Together with scientists from other Latvian universities and Vilnius University UL participates in the co-publishing of a magazine Baltic Journal of Modern Computing (BJMC, https://www.bjmc.lu.lv/editorial-board/). The main co-editors are academician Gintautas Dzemyda from Vilnius University and academician Jāks Vilo from the University of Tartu (SAR, p.80). The BJMC is an important factor both for doctoral students and faculty staff helping them publish research results in internationally recognized media.
FC represents the University of Latvia also in the international association "Informatics Europe" https://www.informatics-europe.org/ whose goal is to develop cooperation among the academic and research community in Informatics in Europe and neighboring countries. The association is active in organizing different webinars, exchanging statistics, and analyzing trends in education and informatics fields in European countries.

1.5.3. There is a certain positive trend in teaching staff and students incoming activities for all levels of study programs but mainly for the bachelor program Computer Science 43483 (self-assessment report, pages 82-84, Annex II-28, Annex II-34), both Exchange Erasmus students and full study programs.

Erasmus program incoming students:
1. the whole ICT study direction: 37 incoming students in the 2021/2022 study year vs 3 students in 2015/2016;
2. bachelor levels of study program 32 incoming students in the 2021/2022 study year vs 2 students in 2015/2016

Full study incoming students:
1. the whole ICT study direction: 60 students to obtain a degree in 2021/2022 study year vs 4

students in 2015/2016;
2. bachelor levels of study program 45 students to obtain a degree in the 2021/2022 study year vs 4 students in 2015/2016

There is also a positive trend in students' outgoing activities (Erasmus), but figures still are lower than for incoming students (self-assessment report, pages 82-84, Annex II-28):
1. the whole ICT study direction: 10 outgoing students in the 2021/2022 study year vs 5 students in 2015/2016;
2. bachelor levels of study program 9 outgoing students in the 2021/2022 study year vs 1 student in 2015/2016.

A significant part of students who joined the Bachelor study program Computer Science 43483 in the 2021/2022 study year came from Ukraine, Russia, and Kazakhstan (36 of 77 students). There is no clear evidence that FC has a sustainable strategy to support a growing trend of international students.

During an assessment visit with all study programs' graduates, there was also negative input from one international graduate whose expectations of onboarding and integration activities were not met. He/she was looking for some basic Latvian language courses, some cultural activities to feel more integrated into Latvian society, and also some opportunities to do a paid job during the doctoral study program. There is a risk that this graduate became a distractor for the Doctorate study program (he/she evaluated his/her readiness to recommend the study at the University of Latvia on a 6-7 in 1-10 scale). The expert group had an opportunity to speak with only one international graduate and there were no international students during the meetings with students.

Information about study programs available for foreign students is published on the website https://www.studyinlatvia.lv/studies?university=university-of-latvia.

Generally, students were well informed about opportunities to participate in the Erasmus program, but not interested to use this opportunity due to their employment or family reasons. 1 of about 10 students said that he/she is planning to do his/her Erasmus in the nearest future.

The number of international teachers does not show any indication of growth (Annex II-34). There were 3-4 international teachers for the whole ICT study field of Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science per year in the last seven years. During the assessment visit, the study field's Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science director confirmed that information about vacancies at FC is published on the University of Latvia webpage. However, according to the field's director, there is low or no interest from foreign professors because of low salaries in Latvia.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
FC has developed very good cooperation with Latvian employers who are generally satisfied with students' knowledge and skills level and are interested to have more employees from FC graduates and students. FC actively participates in Latvian ICT professional associations. However, the number of partnership agreements with international universities is low. There is a positive trend in the growth of numbers of foreign students coming both for the Erasmus exchange program and the full study programs. It is recommended to review onboarding activities for foreign students in order to

ensure their smooth integration into the study process and improve their study experience. The number of international teachers involved in the study process is low.

Strengths
1. Good cooperation with Latvian employers.
2. Effectively working internship program for Programming and computer network administration program (41483).
3. A growing number of international students

Weaknesses
1. Low or no motivation of FC students to participate in the Erasmus program.
2. A Low number of partnership agreements with international universities.
3. No proactive strategy to attract international students to guarantee the sustainability of a growing trend.
4. The number of international teachers involved in the study process is low.

Assessment of the requirement [3]

1 R3 - The cooperation implemented within the study field with various Latvian and foreign organizations ensures the achievement of the aims of the study field.

Assessment of compliance: Fully compliant

The FC has developed very good cooperation with Latvian employers who are satisfied with students' knowledge and skills level.
The FC participates in international research projects. A positive trend in the growth of the number of international students is achieved. For improvement of the study field FC needs to develop a proactive strategy to attract international students and teachers, onboarding activities for foreign students should be reviewed in order to ensure their smooth integration into the study process and improve their study experience and Erasmus program's motivation activities (case studies, work groups, seminars) for FC students should be planned and implemented in order to increase numbers of outgoing Erasmus students.

1.6. Implementation of the Recommendations Received During the Previous Assessment Procedures

Analysis

The study field of Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science in its entirety and the 4 individual study programs received recommendations during the 2017 accreditation process from both AIKA experts and the European Quality Assurance Network for Informatics Education (EQANIE). Additionally, short- and long-term recommendations were received at the licensing of the newly named doctoral program during the reporting period (2021). As explained in the SAR pp. 83, "An overview of the execution of the recommendations received both in the previous accreditation in 2017 and in the licensing and/or change assessment procedures and/or the procedure for including the study program in the accreditation page of the degree program (in 2021), is included in Appendix II-20. In total, 52 direct and indirect recommendations have been identified, of which 48 have been fully implemented, 3 have been implemented within the available resources, and one, which was addressed to the University of Latvia, is in the process of implementation at the Academic Department with deadline 2023."

The mentioned Appendix II-20 lists in a table-like format, under the headlines Recommendation Activity, Achievable outcome, Due date, Responsible person, Implementation of the recommendation, the main characteristics of the recommendations received. The contents of Appendix “II-20.annex. Execution of the implementation plan of the experts' recommendations” show that the University of Latvia has addressed the various issues raised during the evaluations and mostly found ways of improving the signaled issues. Most issues (deriving from short-term recommendations) have been solved or declared to be solved by the end of the year 2018 for the first level/ bachelor/ master programs; most issues (deriving from long-term recommendations of the 2017 accreditation campaign and as short-term recommendations from the doctoral study program licensing from 2021) have been solved or declared to be solved by October 2022, before the submission of the accreditation report.

A more detailed analysis of the signaled issues and their solutions shows that very good improvement has been obtained in some areas (for instance as the information in English regarding study programs and student requirements, or the clarification of admission requirements and their implications on curricula at master and doctoral studies). At the same time, other issues seem to be addressed more lightly, like, for instance, item 19 in annexed document “II-20.annex. Execution of the implementation plan of the experts recommendations” (“(4.) Information on the procedures of the quality management system should be communicated to all the interested parties.”) which is declared solved by the creation of web information pages https://www.df.lu.lv/studijas/lidzdarbiba-studiju-kvalitates-uzlabosana/ containing information just for students, or item 20 in Appendix II.20 (“(5.) The academic staff should be involved in the definition and improvement of the formal procedure of the development and improvement of the study courses.”) which is declared completed, since “Such a procedure exists de facto at University of Latvia, it is known to all study course developers, experts did not notice it” (one should note that the meaning of “de facto” correlates well with the discussions held during the assessment visit meetings with various stakeholders, concluding that there is no “de jure” procedural approach, that is written procedures and implementation tools).

The Implementation of the Recommendations (and suggestions from stakeholders) is also publicly disclosed via the quality improvement registry (in Latvian, an Excel table available for download, with content largely similar to Appendix II-20). Although it is not very clear how this register is populated (some of the recommendations are directly taken from the accreditation reports, some of the recommendations are included via the office of the Dean, etc.) its existence is a significant good practice example that should be maintained and developed.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The FC from the UL, as manager of the study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", has proven that it considers seriously quality insurance, by balanced and transparent analysis of the recommendations received on previous accreditations or licensing.

Strengths
1. The UL has seriously considered the past recommendations and has taken concrete action toward implementing them.
2. Even if not all past recommendations have been implemented per se, the University has laid out a track for doing so in a set time horizon.

Weaknesses
1. Some recommendations have been formally implemented but have not been sufficiently effective in resolving the underlying weakness and/or in completely removing its root causes.

Assessment of the requirement [4]

1 R4 - Elimination of deficiencies and shortcomings identified in the previous assessment of the study field, if any, or implementation of the recommendations provided.

Assessment of compliance: Partially compliant

The FC has proven that it considers quality insurance seriously, by balanced and transparent analysis of the recommendations received on previous accreditations or licensing. Some of the previous recommendations have been considered and declared as solved, but the solving is only partial, as shown in the analysis above.

1.7. Recommendations for the Study Field

Short-term recommendations

1. Establish and implement procedures and methods for formal, documented feedback appropriate to the various stakeholders.
2. Improve the method for the realization of the employment surveys, such that the responsible persons have the means to realize effective, complete, and timely surveys.
3. Inform students about research opportunities at the faculty.
4. Implement tools for foreign Ph.D. students to join research projects and faculty activities.
5. Prepare a short-term plan for attracting more international students and teachers.
6. Need to continue working to complete solving all of the recommendations of the previous evaluation period.

Long-term recommendations

1. Regulate that a larger number of lectures are recorded and made available for students to watch at their convenient speed and time.
2. Perform a wider analysis of opportunities in SWOT analysis.
3. Include the opportunities, identified in the SWOT analysis, in the development plan.
4. Introduce more formal procedures into the study field management and implement them.
5. Increase (or at least keep stable) the number of WoS and Scopus publications.
6. Prepare a long-term plan for the sustainable development of international studies development.
7. Increase the number of partnership agreements with foreign universities.
8. Analyse the reasons for the low motivation of the students to participate in the Erasmus program, and draw the plans to increase it.

II - "Programming and computer network administration"

ASSESSMENT

II - "Programming and computer network administration" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" (study field) includes first level professional study program ‘’Programming and computer network administration’’ 41483 (first level study program), and as mentioned in SAR pp. 88-89, the goal of the first level study program is “To educate ICT professionals ready to learn new technology in a fast-changing environment and can participate in: 1. the development of applications and information systems (for the Software Engineering subprogram), or 2. development and administration of computer networks and computer systems (for the IT subprogram).”

The name of the first-level study program, its goal, and intended specializations (Programmer or Computer Systems and Computer Network Administrator) perfectly fit the study field.

2.1.2.

The first level study programme has two education classification codes 41483 and 41484. According to the classification of Latvian education which can be accessed here: https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju, for both sub-programmes the first part of the code (41) corresponds to the first level professional higher education, for the second part of code (483) – computer systems, databases and computer networks and also the second part of code (484) – programming.
The first level study programme is implemented as full-time, 2 years and 6 months, 100 credit points, in Latvian (SAR, pp. 89). The duration of the first-level study program, its scope, and the implementation in the Latvian language is all justified and reasonable. All the mentioned parameters of the first-level study programme are interrelated. First level study programme provides the qualification of Programmer or Computer Systems and Computer Network Administrator.
The title of the first-level study programme precisely characterizes the study field, the goal, and the outcomes of the first-level study programme.

The admission requirements are explained in SAR pp. 93 “Applicants with secondary education are admitted to the study program, while the criteria for the admission competition are CE in Latvian, CE in Mathematics, and CE in a Foreign Language (English, French or German). To achieve the goal of the program, applicants’ preparation in high school mathematics is essential. Good knowledge of foreign languages, however, is important for achieving other program results in terms of communication, independent literature studies, etc. The requirement to include a CE in the Latvian language in the admission is determined for all study programs at the University of Latvia, it is also essential for the fulfillment of the condition for writing the final theses in the state language.”

The aims and objectives are described in SAR pp 92: “The objective of the study program is to educate ICT professionals ready to learn new technology in a fast-changing environment and can participate in: the development of applications and information systems (for the SE sub-program), or development and administration of computer networks and computer systems (for the IT subprogramme). The objective of the study program determines both the joint part of the sub-programs – to prepare ICT sector specialists, and it is ensured by the courses, which are mainly common to both programs, and the distinctive part – by providing specific knowledge and skills of

the sub-program in specific courses of sub-programs and, to a greater extent, in the sub-program specific internship and qualification work."

In Appendix III-1 (EN-III-1.annex-dipl_1.level.7z) there is attached a sample of the diploma issued for completing the first level study program and its annexes in accordance with the Regulations of the Cabinet of Ministers of 16.04.2013 No. 202 "The procedure for issuing state-recognized documents certifying higher education". In Appendix II-3 (II-3.annex. Templates of study agreements.zip) there is attached a study contract sample according to the Regulations of the Cabinet of Ministers of 23.01.2007 No. 70 "Terms and conditions that must be included in the study contract".

Graduates of the first-level study program work mainly in the IT industry.

2.1.3.
As explained in the SAR pp. 91, the corrections to the first level study programme were directed towards the programmes code, the program curricula, and program implementation.

Program code:

The SAR pp. 91 explains that a supplemental program code is considered, in order to better explain the outcomes of the program: „According to the application of the LU for evaluation of the study direction (see Annex "Application for accreditation-2022.docx"), the Education Classification Code (EQC) is planned to be changed, adding code 41484 to the existing code 41483 (which was approved in the previous accreditation)"

Program curricula:

The SAR pp. 91 explains that new courses have been introduced: „Changes in the content of the program, compared to the previous accreditation, are related to a wider offer of optional courses, as well as compatibility with the Bachelor's study program – a new optional course has been added: "Business platforms" (2 CP), as well as several new courses that had already been available in the undergraduate study program: "Administration of computer networks" (2 CP), "Data structures and algorithms" (4 CP), "Linux system programming" (4 CP), "Databases II" (2 CP). The program includes two sub-programs – "Software Engineering" (SE, professional qualification "Programmer") and "Information Technologies" (IT, professional qualification "Administrator of computer systems and computer networks"), and starting from this period the course "Software Testing" (2 CP) will be a mandatory part of the SE sub-program (previously it was an optional course)."

Implementation:

The SAR pp. 91 mentions that "In the previous accreditation period, the implementation of the program in English was started for the first time. As the implementation of the program in English had already been started in the Bachelor's study program, in which this program is integrated, the conversion of the content of the respective study courses into English, as well as the provision of the teaching staff for teaching in English, had already been completed.". But, at pp. 94 SAR mentions that „Now, there are no English students in the program, and the implementation variant in English of the program is not being brought to the accreditation any more.". Also, on pp. 89-90, the SAR does not mention the implementation of the program in the English language. This information seems contradictory, but we deduce that the English version of the program is not included in the study field accreditation.

All the above-mentioned corrections are justified and supported.

2.1.4. As shown in the SAR, pp. 94, “According to the European Commission’s 2019 report, based on the Digital Economy and Society Index (DESI) on the digital competitiveness of the member states, the number of ICT specialists in Latvia has slightly increased since 2017, however, their percentage in the Latvian labor market is lower than in the EU as a whole. The report notes that the number of university graduates in the field of ICT in Latvia is increasing, reaching 4.8% of all graduates, and exceeds the EU average (3.5%). However, the number of trained ICT specialists lags behind the growing demand in the labor market. Also in the medium-term policy planning document “Digital transformation guidelines 2021-2027” (https://likumi.lv/ta/id/324715-par-digitalas-transformacijas-pamatnostadnem-2021-2027-gadam, only in Latvian) several courses of action have been defined, the result of which would be highly qualified ICT specialists in Latvia who can develop excellent digital solutions and the shortage of labor force in the field of ICT would be reduced. Just to ensure the natural replacement of the generations employed in the industry and to maintain at least the current number of the employed, at least the current number of graduates of computer science programs at Latvian universities is necessary. Along with the shortage of labor in the field of ICT, there is no threat to the availability of jobs in the foreseeable future.”

There is no doubt that in today’s world, the role of ICT is fundamental in the economy and society.

The annex EN-III-5.annex-student-stats-kol presents enrolments and graduation statistics for the program. On average the program enrolls some 40 students in the first year and yields some 40% of them as graduates (on average some 60% overall dropout rate).

The SAR states on pp. 96 that „Because part of the students of the Bachelor’s study program does not transfer to this program to receive a diploma, the dropout rate is slightly lower than the visible 55-70%, however, historically, the dropout rate is still very high and does not tend to change significantly over the years.”

Also in the SAR pp. 96 one provides some analysis of the drop-out rate as follows: „The reasons for dropping out have been analyzed for a long time, but the main ones are two in a mutual combination – the popularity of the program, including the perspective of later employment opportunities, together with the specificity and difficulty of the program, i.e., the program is relatively difficult, which requires additional motivation from the students.”

The SAR and the discussions with the UL staff performed during the assessment visit did not present a proper approach or significant interest in reducing the dropout rate.

2.1.5. N/A

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The first-level study program is well included in the study field. The first level study program is delivered in Latvian, integrated with the bachelor study program “Computer Science” 43483. The first-level study program title is compliant with the study field. The first-level study program delivers a qualification covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the first-level study program are justified and

reasonable. The first-level study program is fully justified and aligned with the requirements of the labor market.

Strengths
1. The first-level study programme is well integrated with the industrial and research trends.

Weaknesses
1. The first-level study programme exhibits a very high student dropout/ all-but-qualification rate.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The FC first-level study program offers two sub-programs - "Software Engineering" (SE), which provides professional qualification for "Programers", and "Information Technologies" (IT), which offers professional qualification for "Administrators of computer systems and computer networks." First level study program requires a full-time commitment of 2 years and 6 months of study and is the only professional study program offered by the FC. It is fully integrated into the University of Latvia academic Bachelor study program Computer Science 43483 and serves as its entry point.

The SAR pp. 97-98 explains the main structure and content of the study plan of the sub-programs; basically, there is a common compulsory part, a unique compulsory part for each sub-program (which is a limited elective part for the other sub-programs), and individual electives. “The program consists of compulsory courses – 62-66 CP (depending on the sub-program), internship and qualification thesis – 26 CP (different content for each sub-program), limited elective courses – 6-10 CP (depending on the sub-program), unlimited elective courses – 2 CP. Compulsory courses that are common to both sub-programs can be structured into several thematically related groups. Programming courses: DatZ1165 Algorithms and programming (6 CP); DatZ1166 Software development fundamentals (5 CP); DatZ1031 Web Technologies I (2 CP); DatZ2019 Web Technologies II (2 CP) Software development and project management: DatZ2072 Software Engineering (6 CP) Computer hardware and computer networks: DatZ1164 Computer Architecture and computer engineering fundamentals I (3 CP); DatZ1170 Computer networks I and insight into industry (3 CP) Operating systems: DatZ1053 Operating systems (2 CP) Databases and information systems: DatZ1139 Databases and Information Systems Fundamentals (3 CP). Classical Mathematics: Mate1009 Algebra (2 CP); Mate2005 Analytical geometry (2 CP); DatZ1143 Discrete mathematics for computers; Mate1014 Calculus I (2 CP); Mate2012 Probability theory and mathematical statistics (2 CP) Mathematical Foundations of Computer Science: DatZ1037 Automata theory (2 CP); DatZ2029 Formal Grammars (2 CP); Mate3044 Mathematical Logic (2 CP) General courses: Chemistry1059 Civil protection (1 CP); Ekon1006 Principles of Economics (2 CP); SDSK1067 Internet, Netiquette and Legal Regulation (2 CP); VadZ1091 Introduction to management (4 CP); VidZ1032 Environmental Protection (1 CP) The specific compulsory courses of the sub-programmes (for other sub-programme, 98 they are the limited elective courses respectively): The field-specific course of the “Software Engineering” (SE, professional qualification “Programmer”) sub-programme: DatZ3038 Software testing (2 CP), Field-specific courses of the “Information Technology” (IT, professional qualification “Administrator of computer systems and computer networks”) sub-programme: DatZ2159 Computer Architecture and computer engineering fundamentals II (2 CP): DatZ1039 Computer Networks II (2 CP); DatZ2076 Computer Networks Administration (2 CP).”

The content is topical, inter-connected, and complementary and corresponds to the requirements of the industry and current trends of the field.

Upon completing the first level study program, students have the option to continue studying for an additional 1.5 years to obtain their academic Bachelor's degree. However, if they decide to interrupt their studies after graduating from the first-level study program, they will still receive a 1st level (college-level) higher education diploma.

The practical approach of the first-level study program, useful content, and effective organizational processes have received positive feedback from employers, students, and graduates during assessment visit meetings with the Experts Group. These include placement into internships, employers' involvement, and integration with the academic Bachelor's program Computer Science 43483.

An analysis of the first-level study program compliance with the requirements of Regulation of the Cabinet of Ministers No. 141 (Adopted 20 March 2001), which outlines the state standard for First Level Professional Higher Education, was carried out by the FC. This analysis evaluated the first-level study program objectives, achievable learning outcomes, and content, as outlined in Annex III-6 of the Self-Evaluation Report.

The analysis was conducted accurately, covered all necessary elements of the state regulation, and fully confirmed the compliance of the first-level study program and the national regulation regarding first-level study program objectives, achievable learning outcomes, and content.

The compliance of the first-level study program with professional standards was assessed by the FC in Annex III-7 of the Self-Evaluation Report. A separate analysis was done for each subprogram (software engineering (SE), or information technology (IT)) by using two professional standards:
1. Programmer professional standard (professional qualification “Programmer”): https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-221.pdf
2. Computer systems and computer network administrator professional standard (professional qualification “Computer systems and computer network administrator”): https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-219.pdf

The latest versions of the Programmer professional standard (Agreed on at the meeting of the tripartite cooperation sub-council of vocational education and employment on 8 June 2022, protocol No. 3) and the Computer systems and computer network administrator professional standard (Agreed on at the meeting of the tripartite cooperation sub-council of vocational education and employment on 8 June 2022, protocol No. 3) were used for the analysis. The mapping of first-level study program courses to knowledge, skills, and competencies necessary for performing the basic tasks of the professional activity, as defined in professional standards, was carried out correctly, and general compliance was confirmed. However, there is partial compliance only regarding foreign language requirements of the standards. Both Programmer and Computer systems and computer network administrator professional standards require skills in at least two foreign languages. According to Annex III-7 of the SAR, the first-level study program includes courses in the English language only.

ICT sector experts and employers’ representatives were actively involved in the process of professional standards development. The most recent version of the standard was used by FC for first-level study program analysis (the year 2022), confirming that the first-level study program meets the needs of the industry, labor market, and the latest scientific trends.

The mapping of study courses to the learning outcomes of the first-level study program was correctly carried out by FC in Annex III-8 of the SAR, and compliance was confirmed.

Annex III-7 (EN-III-7.annex-compl-prof-std-kol .docx) “Compliance with the professional standard of the first-level professional higher education program “Programming and Computer Network Administration” confirms that the program only partly complies with the standards of professions. The standards of the professions state that in order to fulfill the basic tasks and duties of the professional activity, the student must be able to use professional terminology in at least two foreign languages in communication and for the performance of work duties. The program currently includes only one foreign language “Industry English” (2 CP) and it is offered as an optional course. Experts have based their opinion on two Latvian professional standards. Both standards are current and are available at the links below: PROFESSIONAL STANDARD FOR PROGRAMMERS (LKI 5)
https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-221.pdf -
agreed at the meeting of the Tripartite Cooperation Sub-Council for Vocational Education and Employment of 8 June 2022, Minutes No 3.
Requirement of the standard: “5.2 Ability to use two foreign languages in professional communication. (LKI 5)”
PROFESSIONAL STANDARD FOR COMPUTER SYSTEMS AND NETWORK ADMINISTRATORs (LKI 5).
https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-219.pdf - agreed at the meeting of the Tripartite Cooperation Sub-Council for Vocational Education and Employment of 8 June 2022, Minutes No 3.
Requirement of the standard: “5.2. Ability to use professional terminology in at least two foreign languages (LKI 5)”.
According to SAR, FC has used the same professional standards (pp. 98-99).
In addition, the Compliance of study program courses with the programmer profession standard (EN-III-7.annex-compl-prof-std-kol .docx) is missing the study course “Software testing” mentioned in the SAR p.88 as a sub-program specific compulsory part study course, but it (DatZ3038 Software testing) is included in the plan of the study program (EN-III-9.annex-st-plan-kol.docx) as a compulsory course for sub-program “Software engineering” and compulsory part study course for sub-program “Information technologies” .

The study plans for both sub-programs of the first level study program provided in Annex III-9 of the SAR correctly interconnect mandatory courses, complementary courses, and internships, correspond to the objectives of the program, and ensure the achievement of learning outcomes.

Detailed course descriptions for the first-level study program are provided in Annex III-10 of the Self-Evaluation Report. Courses' objectives, prerequisites, learning outcomes, and content are described in detail, proving that the content of the study courses is interconnected and allows for the achievement of first-level study program objectives.

2.2.2. N/A

2.2.3. Description of a detailed approach to students’ independent work organization, assignments, requirements for awarding credits, and criteria for evaluating learning outcomes for each study course and seminar is provided in Annex III-10 of the Self-Evaluation Report. The document outlines clear and systematic rules to ensure a tailored approach to student learning and a results-oriented study process. A variety of teaching methods, such as independent and group assignments, laboratories, internships, e-learning, and seminars, are employed to ensure student-centered learning. The overall impression is that the employed methods contribute to the achievement of the program's aims and objectives and of the learning outcomes.

To continuously improve the study process, regular surveys are conducted among students and

graduates, providing FC with valuable feedback. The corresponding course's teachers, study program, and field directors analyze the survey results, as outlined in Annex II-24, Annex II-25, Annex II-26, and Annex II-27 of SRE.

Additionally, students have the flexibility to change their specialization (SE and IT) within the study program if their professional interests shift during their studies, reflecting a student-centric approach ((Annex III-10 of SRE, inputs from meetings in assessment visits with study program students and teachers.) This is also explained in SAR pp. 101: "The study program has two sub-programs – "Software engineering" (SE, professional qualification "Programmer") and "Information technologies" (IT, professional qualification "Administrator of computer systems and computer networks"), and the choice of the subprogramme is carried out the following way: initial choice – at concluding the study agreement (subject to change later) final choice – at the beginning of the 4th semester, as internship and qualification paper (in semesters 4 and 5) are sub-program specific, and almost all sub-program specific courses are scheduled in semester 4."

2.2.4. The first-level study program is committed to providing students with a comprehensive and practical education, and the internship component is a key part of this. The internship UL regulations are outlined in detail in Annex III-2 of the Study Program Regulations (SER). As the SAR pp. 102 explains, "The duration of the internship is 680 hours (17 CP). It should be noted that the study plan includes study courses Internship I and Internship II in the amount of 18 CP in total, where 1 CP is intended for face-to-face lessons at the University of Latvia on the issues of the internship, while internship in industry, which is covered by the Internship Regulations, is in the amount of 17 CP. The internship is performed in the fourth and fifth semesters during 17 weeks in full-time mode".

The goals and tasks of the internship are clearly defined, with specific processes, stages, and management rules outlined in the same annex of the SER. The objectives and tasks of the internship are designed to simulate real programming or computer system and computer networks administrator duties, allowing students to develop practical professional skills in these areas. The SAR pp. 103 mentions examples of internships: "The largest number of interns (24) completed the internship at the Accenture Latvian branch, followed by Wonderland Media (11) and TestDevLab (7). In two companies, EMERGN and the Institute of Mathematics and Informatics of the University of Latvia, 4 interns performed internships in each of them. Both Collective Intelligence Research Centre and Visma Labs successfully cooperated with 3 interns. Seven companies accepted 2 interns each and provided internships – DELFI, CGI IT Latvia, Creative IT Development, DIVI grupa, iSoft Solutions, Tet, and ZZ Dats. All other companies accepted one intern."

To facilitate the internship experience, the UL and its FC have signed several contracts with Latvian companies over the past five years, with close to 400 contracts signed in total (as indicated in Annex II-19 of the SAR).

The first-level study program also places a strong emphasis on involving employers in the internship implementation process. As a result, almost all internships become the first employment opportunity for students. In the assessment visit through meetings with students, employers, and internship providers, the experts have received positive feedback on the compliance of real and documented practices. Both students and employers have reported a positive experience with the study program Internship program, which has reinforced its reputation as a high-quality program that effectively prepares students for their future careers.

2.2.5. N/A

2.2.6. The qualification thesis is an integral part of the first-level study program, and students at FC are required to write their thesis immediately following their internship. The thesis is closely related to the topics covered during the internship, and almost half of the thesis supervisors are industry professionals from the ICT sector. The ability to implement the work in real-world scenarios is a key indicator of the quality of the thesis.

To ensure that students are well-prepared to develop their theses and understand the goals of the qualification paper, a special study course was created in 2020. The course, DatZN009 Qualification Paper in Programming and Computer Network Administration (Ap) - 8 CP, is described in Annex III-10 on pages 110-112.

The course emphasizes that the result of the qualification work should be an independently created software product or independently performed computer network structure administration work.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The practical approach of a first-level study program, useful content, and effective organizational processes are supported by employers, students, and graduates. The first-level study program is well integrated into the academic Bachelor study program Computer Science 43483. The internship process and procedures have been carefully developed in accordance with Latvian state and UL regulations. The first-level study program places a strong emphasis on involving employers in the internship implementation process. The qualification work is an independently created software product or independently performed computer network structure administration work. However, first-level study program study courses are only partially compliant with the latest version of professional standards (the year 2022).

Strengths
1. The practical approach of first level study program
2. Study program integration in the academic Bachelor study program Computer Science 43483.
3. Internship outside of FC in the real business environment
4. Strong involvement of employers in the internship implementation process and qualification project development

Weaknesses:
1. There is no full compliance of the first-level study program with the requirements of Programmer and Computer systems and computer network administrator professional standards. Both standards require two foreign language skills. The first-level study program includes the study course in English only.

Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)

1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

Assessment of compliance: Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The material, technical, information, and study provision are all used in all levels of this study field, therefore do not differ between included study programs. A more thorough analysis can be seen at 1.3. Section of this report.

Mainly the study process is conducted at Raiņa Bulvāris 19. At the main premises, there are available larger auditoriums (up to 130 places), 3 seminar rooms, 4 computer classes (20-25 places), a Linux center (20 places), and “DF LAB”, that serves as a more “creative space” for students to work on their practical works/thesis, etc. There are available 3D printers, Speedy 400 laser cutters, soldering stations, and others. Auditoriums, seminar rooms, and computer classrooms are fully equipped with projectors, portable computers, desktop computers, wireless Internet, sound system, and electricity connection points for student workplaces (partially). (SAR p.56-57) Taking into account all the previously mentioned, the study, material, and technical provision is sufficient and provides the possibility to ensure a high-quality study process.
In the same building, there is an available library that provides the methodological and informative provisions needed for the implementation of this study program. (SAR p.59) There are two e-studies environments available – estudijas.lu.lv and edu.lu.lv, that provide access to all the needed resources, grading, etc. (SAR p.60)
The finances are planned locally by the faculty and planned together rather than separated specifically by the study program. (SAR p.55) The experts believe that this manner is sufficient since most materials are planned for all the programs and therefore the financial provision is sufficient.

2.3.2. N/A

2.3.3.The calculated state budget grant from the Ministry of Education and Science in the 2021/2022 academic year is 2445 EUR for full-time regular studies. The tuition fee for studies in the Latvian language is 2450 EUR/year. The fee for studies in English is 2900 EUR/year, however, there are no students studying in English, and studies in English are not bought for accreditation. The program is implemented only in the form of full-time regular studies. (SAR p.107)

When planning the costs, all general indirect costs are deducted for any study program. The calculated cost of the full-time program is 2,343 EUR per student per year, and the total cost of the program is 159,324 EUR per year. The largest expenditure is planned for salaries: teaching staff (38.6%) and general (27.1%). Indirect costs come up to 26%, infrastructure 5.3%, and goods and services make up 3%. (SAR p.108)
The sensitivity analysis graph of cost based on the number of students shows that with the study fee of 2450 EUR/year, the rentability is achieved at around 65-72 students. The minimum number of enrolled students is stated as 25. From the available statistics (III-5 Annex), the number of active students in the program is from 66 (in 2017/2018) to 82 (in 2019/2020), which shows that the program is rentable at the current cost. The matriculated students usually differ between 38 and 42 which is above the minimal number and therefore sufficient.
The experts believe that the funds are sufficient and allow the development of the first level study program.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions

The study provision is sufficient for the implementation of the first level study program. Studies are held at the faculty building that offers auditoriums with computers. The methodological and informative resources are accessible to students via two main websites and are sufficient.
The fee is planned at the same amount as it is calculated by the state funding. The finances are balanced. The first level study program is sustainable and the number of students exceeds the minimal number.

Strengths
1. The matriculated number of students exceeds the minimum number of students in the assessment period.
2. The library has sufficient methodological materials that are replenished regularly.
3. There is a large variety of equipment available for practical classes.

Weaknesses
None

Assessment of the requirement [6]

1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

Assessment of compliance: Fully compliant

The resources are sufficient for the implementation of the first level study program. The finances are balanced.

2.4. Teaching Staff

Analysis

2.4.1. The SAR (p.110) and attached Annex II-11 “List of teachers involved in the implementation of programs of the study direction (lecturing in study courses) in 2021” affirm that the qualification of the teaching staff is appropriate for the study program implementation and allow to achieve the aims and ensure the learning outcomes of the first level study program in both Latvian and English languages.

The implementation of the study program is ensured by 41 lecturers (14 professors, 5 associate professors, 12 assistant professors, 3 lecturers, and 7 teachers (1 of them with a doctor’s degree)), 78% of them with a doctor’s degree, 22% with a master’s degree. 31 lecturers (professors - 14, associate professors - 5, assistant professors - 12) are elected at the FC which forms 76% of all lecturers (SAR, p.110).

The involvement of many UL lecturers is justified by the fact that lecturers teach study courses that correspond to their field of research as evidenced by the attached annex II-17 on teaching staff publications and the study courses taught by them.

In study courses related to the latest technologies, lecturers use their practical experience gained in projects or industry (SAR, p.110). In addition, Annex II-16 confirms that 24 teachers of FC have participated in projects, and on average 20 other staff members have annually participated in the internal UL research project “Innovative Information Technologies” (Annex II-16, p.5).

SAR states that academic staff from other faculties (7 out of 41) is involved in the implementation of the study program as well. Among them, there are 5 lecturers with a doctor's degree (78%) and 2 (22%) with a master's degree who teach individual courses in the relevant field, for example, in economics, mathematics, chemistry, and geography (SAR, p.110).

The qualification of teaching staff is assessed upon election to academic positions according to the procedures set out in the UL regulatory documents, for example, "Regulations on academic and administrative positions at the University of Latvia" (Confirmed with the LU Senate 31.01.2022 decision no. 2-3/11). The aforementioned regulation states that, in compliance with the need to acquire practical skills and knowledge, the position of associate professor and assistant professor in profile subjects of professional study programs can also be held by a person with higher education without a scientific degree, but the position of a lecturer or assistant - also without an academic degree, if he has a degree for the subject being taught relevant sufficient practical experience.

2.4.2. To ensure the high-quality of implementation of the study program since 2015, only persons with scientific degrees and PhDs have been elected to pedagogical academic positions (professor, associated professor, assistant professor) in the FC (SAR, p.110).

The requirements set for the candidates for an academic position (professor) are set in accordance with the "Regulations on academic and administrative positions at the University of Latvia" (Confirmed with the LU Senate 31.01.2022 decision no. 2-3/11), the Law of Higher Education Institutions, the Law of Scientific Activity and other regulatory enactments.

The requirements are described in the list below (Regulations on academic and administrative positions at the University of Latvia, p.5).

A person who has a doctoral degree, who is an internationally recognized specialist in his field, who has scientific publications, textbooks or teaching aids relevant to the field of science, who actively carries out scientific work, provides high-quality studies in the relevant field of science and who has at least three years of academic work experience as an associate professor or professor.
The position of associate professor can be applied for by a person who has a doctoral degree, who provides high-quality studies in the relevant field of science, who has scientific publications, books, or teaching aids/materials relevant to the field of science, and who actively carries out scientific work.
The position of assistant professor can be applied for by a person who has a doctoral degree, relevant publications in the scientific field, and who is able to give lecture courses, lead seminars, practical classes, and laboratory work.

As SAR states, initially, a person is involved in the teaching process in the FC, the evaluation of teaching results is carried out after course implementation and the possibilities for election to the position are considered (SAR, p.111).

FC is actively involving doctoral students in the teaching process during their doctoral studies, for example, in teaching study courses, supervising and reviewing coursework, and final theses (SAR, p.110, 177), which was approved by doctoral students and FC management during the visit. Thus doctoral students gain experience in academic work, and after obtaining the degree, they can already be elected to the position of an assistant professor (SAR, p.111). However, foreign doctoral students expressed regret during the experts' visit that they were not offered to work in the faculty, such as teaching staff or researcher in the project.

During the reporting period, 14 persons (professors (4), associate professors (5), and assistant professors (5)) were elected to the respective position for the first time. There were also 2 cases where lecturers showed good results in teaching and met the qualifications, i.e., during the reporting period, they were elected for the first time to the position of assistant professor, and later also to the position of associate professor (SAR, p.111). It shows the confirmation of the compliance of the teaching staff's qualifications and the high evaluation by both the students and the management. These changes have a positive effect on the quality of the implementation of the study program.

Overall, the first-level study program complies with the requirements specified in the Law of Higher Education Institutions and the Law of Scientific Activity. But it should be noted that since May 2015, only persons with scientific degree PhDs have been elected to pedagogical academic positions in the FC (there are no lecturers and assistants in the faculty) (SAR, p.110). However, the Law on Higher Education Institutions also allows the election of persons with a master's degree to the positions of lecturer and assistant. In addition, the "Regulations on academic and administrative positions at the University of Latvia" states that, in compliance with the need to acquire practical skills and knowledge, the position of associate professor and assistant professor in profile subjects of professional study programs can also be held by a person with a higher education without a scientific degree, but the position of a lecturer or assistant - also without an academic degree, if he has a degree for the subject being taught relevant sufficient practical experience. Therefore, experts conclude that UL sets higher requirements for candidates in academic positions, i.e. their qualifications and scientific experience, and prevents persons without a doctoral degree from being elected to an academic position.
It was evident that the necessary procedures for the engagement and recruitment of staff have been established.

2.4.3. N/A

2.4.4. Each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions as evidenced by the attached annex II-17 on teaching staff publications.

2.4.5. SAR states that study courses are developed and taught by different persons. The course development process includes separate activities (SAR, p.112).
1. The author of the study course consults the program director about the prior knowledge for the course, as well as about possible overlaps with other courses in the program.
2. It is evaluated, which semester of the study program the course should be included in, based on the necessary prior knowledge.
3. The developers of the study course prepare the content of the study course and its description. The responsible teaching staff is also involved in the preparation process.

The program also includes several study courses, which are taught by several members of the teaching staff, not including the lecturers involved in conducting practical work or correcting students' tests (SAR, p.112).
According to the regulatory document "DEVELOPMENT AND UPDATE ORDER OF STUDY COURSES AT LATVIA UNIVERSITY" (approved by LU on 10.08.2018. order No. 1/277, Annex II-4) the study course must be updated at least once during the current accreditation period. In addition, SAR states that updating the content of the study courses should take place at least once every three years, but if

necessary, also before each study semester. The updating of study course content is carried out in cooperation, of course, developers and responsible teaching staff (SAR, p.112).

During assessment visit interviews with teaching staff, the experts did not gain confidence that the teaching staff is actively involved in renewing the content of study course programs. Several faculty members mentioned existing procedures for developing new courses. But only a few noted that they have renewed the curriculum of study courses based on the results of the mandatory survey of students and students' comments.

The information provided by the teaching staff, and faculty management during interviews and demonstration of the Moodle system shows the active and successful use of the e-study system (Moodle, MS Teams) in the study process and its organization. In addition, students confirmed during the interview that all the necessary study materials for successful study course learning are provided in the Moodle system.

During the assessment visit interviews, students mentioned that there is a study course that is organized and learned on the basis of student reports. In experts' opinion, a student's report could be one of the student's independent works. But the study course should also include other learning methods and test types, such as lectures, seminars, laboratory work and practical work, independent work, etc.

Conclusions on this set of criteria, by indicating strengths and weaknesses

Conclusions
The implementation of the first-level study program is ensured by competent academic staff. The study process is successfully implemented in the UL. Academic staff actively use the Moodle system to provide necessary materials for the study course learning but do not pay sufficient attention to the updating of study course programs. In addition, UL sets higher requirements for candidates in academic positions, i.e. their qualifications and scientific experience, and prevents persons without a doctoral degree from being elected to an academic position. The law does not prevent the election of a person without a scientific degree or an academic degree, if he/she has rich practical experience gained in the industry and/or has appropriate knowledge in the taught subject.

Strengths
1. The qualification of the teaching staff is appropriate for first-level study program implementation and to achieve the aims and ensure the learning outcomes of the study program in both Latvian and English languages.
2. The competencies of the academic staff in the study field are high.
3. FC involves selected doctoral students in the teaching process during their doctoral studies. Doctoral students have opportunities to gain experience in academic work, and after obtaining the degree candidate to be elected to the position of an assistant professor or higher.
4. The e-studies system is used actively both by academic staff and students and provides students with sufficient necessary materials.

Weaknesses
1. There is a lack of a systematic, regular process for updating study courses. Only a few members of the teaching staff noted that they have renewed the curriculum of study courses based on the results of the mandatory survey of students.
2. Although the necessary procedures for the engagement and recruitment of staff have been established, an established procedure prevents persons without a doctoral degree from being

elected to an academic position.
3. Some teaching staff use an insufficient range of methods that would promote high-quality presentation and learning of the course material and topics, as well as achieving course results.
4. Involvement of doctoral students in the faculty's activities is non-systematic.

Assessment of the requirement [7]

1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

Assessment of compliance: Fully compliant

The qualification of the academic staff complies with the requirements specified in the Law of Higher Education Institutions, the Law of Scientific Activity, and UL regulatory documents, as well as with the conditions for the implementation of the first-level study program. Despite some shortcomings related to study course program updating and an insufficient range of methods applied by some teaching staff, compliance of the qualification of the academic staff is assessed as fully compliant.

2.5. Assessment of the Compliance

Requirements

1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard

Assessment of compliance: Fully compliant

Annex III-6 (EN-III-6.annex-compl-national-edu-std-kol (1).docx) confirms that the first level study program complies partly with the Minister Cabinet Regulation Nr.141 “Noteikumi par pirmā līmeņa profesionālās augstākās izglītības valsts standartu”

2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

Assessment of compliance: Partially compliant

Annex III-7 (EN-III-7.annex-compl-prof-std-kol .docx) “Compliance with the professional standard of the first-level professional higher education program “Programming and Computer Network Administration” confirms that the program only partly complies with the standards of professions. The standards of the professions state that in order to fulfill the basic tasks and duties of the professional activity, the student must be able to use professional terminology in at least two foreign languages in communication and for the performance of work duties. The program currently includes only one foreign language “Industry English” (2 CP) and it is offered as an optional course. In addition, the Compliance of study program courses with the programmer profession standard (EN-III-7.annex-compl-prof-std-kol .docx) is missing the study course “Software testing” mentioned in the SAR p.88 as a sub-program specific compulsory part study course, but it (DatZ3038 Software testing) is included in the plan of study program as compulsory course for sub-program “Software engineering” and compulsory part study course for sub-program “Information technologies” (EN-III-9.annex-st-plan-kol.docx).

3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561 , Paragraph two and Section 562 , Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Fully compliant

Attached study course descriptions (Annex III-10, EN-III-10.annex-course-synopsis-kol.docx) are prepared in Latvian and English languages (the only language in which the study program is implemented is Latvian) and comply with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions

4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

Assessment of compliance: Fully compliant

The provided Diploma samples (EN-III-1.annex-dipl_1.level.7z) comply with the criteria set in the Minister Cabinet regulation No.202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”. But faculty management should pay careful attention to the information mentioned in Clause 16. The size of the diploma, except for the cases mentioned in Clause 17 of these regulations, must be an A5 page (148 x 210 mm).

5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

Assessment of compliance: Not relevant

6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Not relevant

7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

Assessment of compliance: Not relevant

8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

Assessment of compliance: Fully compliant

The attached Annex II-13. annex. Certificate of the Head of the study direction regarding state language proficiency of teaching personnel.edoc, where the certificate of the Head of the study field regarding state language proficiency of teaching personnel (signed at 09.10.2022) affirms

that the knowledge of the official/national language of the academic staff involved in the implementation of study program complies with the Regulations on the extent of knowledge of the national language and the procedure for testing the knowledge of the national language for performing professional and official duties.

9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

Assessment of compliance: Not relevant

10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

Assessment of compliance: Fully compliant

The attached Templates of Study agreements (II-3.annex. Templates of study agreements.zip) comply with the requirements set in the Minister Cabinet regulation No.70 “Studiju līgumā oblgāti ietveramie noteikumi”.

11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

Assessment of compliance: Fully compliant

The Agreements with Riga Technical University on students takeover in case of cancel of study programs (see II-33. annex. Agreements with RTU on students takeover in case of cancel of study programmes.zip.) affirms that students are provided with opportunities to continue their education in Riga Technical University professional bachelor (first cycle) study program “Computer systems” if the implementation of the study program is terminated.

12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme’s license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

Assessment of compliance: Fully compliant

The attached Annex II-32. (II-32. annex. Proof of compensation by the Rector.docx) “Proof of compensation by the Rector” (Riga, 28.12.2021. , No 1-13/831) affirms that students are guaranteed compensation for losses if the study program is not accredited or the study program’s license is revoked due to the actions of the higher education institution and the student does not wish to continue studies in another study program.

13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

Assessment of compliance: Not relevant

14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

Assessment of compliance: Not relevant

Assessment of the requirement [8]

1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

Assessment of compliance: Partially compliant

The first-level professional higher education program “Programming and Computer Network Administration” only partly complies with the standards of professions. The standards of the professions state that in order to fulfill the basic tasks and duties of the professional activity, the student must be able to use professional terminology in at least two foreign languages in communication and for the performance of work duties. The program currently includes only one foreign language “Industry English” (2 CP) and it is offered as an optional course.

During the conversation with the teaching staff in assessment visit, the Experts were not convinced that the study course programs are regularly updated, e.g. changes in the range of topics, technologies to be used, list of literature. Although study course descriptions are updated according to University of Latvia procedures (update study course at least once within the accreditation period), faculty management and teaching staff should pay more attention to regularly updating course descriptions, taking into account the rapid development of the IT industry, labor market needs and recommendations from industry experts.

General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme

Conclusions
The first-level study program is well included in the study field and its title is compliant with the study field. The first level study program is delivered in Latvian, well integrated with the bachelor study program “Computer Science” 43483. The first level study program delivers a qualification covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the first-level study program are justified and reasonable. The study program is fully justified and aligned with the requirements of the labor market. The practical approach of a first-level study program, useful content, and effective organizational processes are supported by employers, students, and graduates.
The resources are sufficient for the implementation of the first level study program. The finances are balanced. The implementation of the first-level study program is ensured by competent academic staff. UL sets higher requirements for candidates in academic positions, i.e. their qualifications and scientific experience, and prevents persons without a doctoral degree from being elected to an academic position.

Strengths
1. The first-level professional higher education program is well integrated with the industrial and research trends.
2. Study program integration in the academic Bachelor study program Computer Science 43483.
3. Strong involvement of employers in the internship implementation process and qualification project development
4. The matriculated number of students exceeds the minimum number of students in the assessment period.
5. The qualification of the teaching staff is appropriate for first-level study program implementation and to achieve the aims and ensure the learning outcomes of the study program in both Latvian and English languages.

6. The e-studies system is used actively both by academic staff and students and provides students with sufficient necessary materials.
7. FC involves selected doctoral students in the teaching process during their doctoral studies. Doctoral students have opportunities to gain experience in academic work, and after obtaining the degree candidate to be elected to the position of an assistant professor or higher.

Weaknesses
1. The program exhibits a very high student dropout/ all-but-qualification rate.
2. There is no full compliance of the first level study program with the requirements of the Programmer and Computer systems and computer network administrator 3. professional standards. Both standards require two foreign language skills. The study program includes the study course in English only.
4. A systematic, regular process for updating study courses is lacking.
5. Novel, student-centric teaching methods and practices are not widely applied in the study program.
7. Although the necessary procedures for the engagement and recruitment of staff have been established, an established procedure prevents persons without a doctoral degree from being elected to an academic position.
8. Involvement of doctoral students in the faculty's activities is non-systematic.

Evaluation of the study programme "Programming and computer network administration"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Programming and computer network administration"

Short-term recommendations

1. Consider implementing a consistent plan for the reduction of the student drop-out rate.
2. Evaluate the range of applied methods in all study courses, check and eliminate shortcomings in teaching methods used that prevent promoting high-quality presentation and learning of the course topics/content, as well as achieving course results.

Long-term recommendations

1. Consider the development of a timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation, targeting the statistics of employers.
2. Formalize program changes management and teaching staff involvement in the process.
3. Implement a systematic, regular process of updating study courses including renewal of the curriculum of study courses at least once every two years.
4. Consider the possibility of hiring, as well as electing a person who does not have a science degree, but has knowledge in the taught subject and experience in the relevant field gained in the industry, to the position of assistant professor or associate professor.

5. Consider hiring or electing a person with the appropriate academic degree for the position of lecturer.
6. Consider hiring or electing a person with the appropriate academic degree for the position of lecturer.
7. Ensure compliance with the standards of the professions that require the use of professional terminology in at least two foreign languages in communication and for the performance of work duties.
8. Make the involvement of all doctoral students in the teaching process more systematic.

II - "Computer Science" ASSESSMENT

II - "Computer Science" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" (study field) include academic bachelor study program “Computer Science” 43483 (bachelor study program), with the goal to “prepare specialists who are able to design and develop complex applications and information systems” [SAR] pp. 139.

Also according to SAR pp. 140, “The requirements of learning outcomes are detailed in the document “Euro-Inf Framework Standards and Accreditation Criteria for Informatics Programs. New Programme Outcomes” (last update – 12.10.2015), which was approved by the organization “European Quality Assurance Network for Informatics Education” (EQANIE).” The University of Latvia is accredited for the Computer Science program by EQUANIE (2017). As explained in SAR pp. 142, there are five specializations: “CS – Computer Science (researchers and lecturers), CE – Computer Engineering (specialists in embedded software, sensor networks), SE – Software Engineering (programmers and software project managers), IT – Information Technologies (computer network specialists and project managers), IS - Information Systems (database and information systems specialists and project managers)”.

The name of the bachelor study program, its goal, and intended specializations perfectly fit the study field.

2.1.2. The bachelor study program provides the degree of “Bachelor of Natural Sciences in Computer Science”. The code of the bachelor study program is 43483, with the last 3 numbers (483) standing for Computer systems, databases, and computer networks according to the classification of Latvian education which can be accessed here: https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju and the bachelor study program is implemented in versions of full-time, 4 years, 160 credit points, in both Latvian and English and as part-time, 4 years and 6 months, 160 credit points, in both Latvian and English [SAR pp. 140-141]. The duration, language, and scope are reasonable and justified.

In Appendix IV-1 (IV-1. annex Dipl_pielik.zip) there is attached a sample of the diploma issued for completing the bachelor study program and its annexes in accordance with the Regulations of the Cabinet of Ministers of 16.04.2013 No. 202 “The procedure for issuing state-recognized documents

certifying higher education". In Appendix II-3 (II-3.annex. Templates of study agreements.zip) there is attached a study contract sample according to the Regulations of the Cabinet of Ministers of 23.01.2007 No. 70 "Terms and conditions that must be included in the study contract".

The admission criteria are explained in SAR pp. 145: "Applicants with secondary education are admitted to the study program, while the criteria for the admission competition are CE in Latvian, CE in Mathematics, and CE in a Foreign Language (English, French or German). To achieve the goal of the program, applicants' preparation in high school mathematics is essential. Good knowledge of foreign languages, however, is important for achieving other program results in terms of communication, independent literature studies, etc. The requirement to include a CE in the Latvian language in the admission is determined for all study programs at the University of Latvia, it is also essential for the fulfillment of the condition for writing the final theses in the state language. In regards to admission to the studies in the English version of the Bachelor's program for persons who have obtained secondary education abroad, there are the following admission rules: 1) a secondary education document must show a successful assessment in mathematics (or an average grade in algebra and geometry); 2) the results of international English language tests, which are confirmed by a document issued within the last five years (except for cases where secondary education was obtained in English) with a certain level of language proficiency indicated for each of the accepted tests"
The objective of the program, as stated in the SAR pp. 144 is "to prepare specialists who are able to design and develop complex applications and information systems, and the tasks of the program, the results of the study program are defined in accordance with the document entitled "Euro-Inf Framework Standards and Accreditation Criteria for Informatics Programmes. New Programme Outcomes" (last update in 2015) issued by the international organization European Quality Assurance Network for Informatics Education (EQANIE)."

The learning outcomes are compliant with the international recommendations, as explained in SAR pp. 144: "In the review report "Referencing of the Latvian Education System to the European Qualifications Framework for Lifelong Learning and the Qualifications Framework for the European Higher Education Area" (available at: http://www.nki-latvija.lv/content/files/LQF_evaluation_of_situation_2013.pdf) it is noted that LQF levels were developed in accordance with QF-EHEA (the Qualifications Framework of European Higher Education Area), where LQI level 6 corresponds to QF-EHEA cycle 1. The EQANIE (European Quality Assurance Network for Informatics Education) document entitled "EURO-INF FRAMEWORK STANDARDS AND ACCREDITATION CRITERIA FOR INFORMATICS DEGREE PROGRAMMES, 2016" (https://eqanie.eu/wp-content/uploads/2019/09/Euro-Inf-Framework-Standards-and-Accreditation-Criteria-V-2016-10-24.pdf), formulates program learning outcomes for graduates of accredited first and second cycle informatics study programs, according to QF-EHEA."
Graduates of the bachelor study program work mainly in the IT industry.

The title of the bachelor study program precisely characterizes the study field, the bachelor study program goal, and the outcomes of the bachelor study program. All parameters of the study program are interrelated.

2.1.3. The framework of the bachelor study program objective, tasks, and learning outcomes, compared to the existing version of the bachelor study program, have not been changed significantly. Still, the SAR pp. 140-141 mentions some modifications performed in the curricula and their implementation.

Curricula changes

SAR pp. 141 mention that „Changes in the content of the Computer Science Bachelor's study program, compared to the previous accreditation, are related to a wider offer of optional courses, i.e., new optional courses were added: "Database Practice", "Applied Deep Learning", "Business Platforms". The opportunity to offer new topical content has been preserved through the courses "Special Seminar I" – "Special Seminar IV", within which special seminars have been announced covering topics such as "Blockchains", "Language technologies and artificial intelligence" etc."

Implementation changes

A new specialization Computer Science [Lincoln] is included in the next accreditation period. The specialization was developed in cooperation with the University of Lincoln (Great Britain). The content and achievable learning outcomes of the Bachelor's study programs in Computer Science of both universities were compared and evaluated. It was found that the content of the 1 st-3rd years of the UL Bachelor's program in Computer Science (duration 4 years) covers the content of the first two years of the Lincoln study program (duration 3 years). The 4th year of the specialization Computer Science [Lincoln] was developed in correspondence with the plan of the Bachelor's program of Lincoln. Students in the Computer Science [Lincoln] specialization will have the opportunity to learn both the study courses of the UL Bachelor's program in Computer Science, as well as some new courses included in the Bachelor's program in Computer Science, courses were developed according to the study course descriptions of the University of Lincoln, and at the end of the studies, students who have completed the Computer Science [Lincoln] specialization, will also receive a diploma from University of Lincoln. Computer Science [Lincoln] is not a joint study program with the University of Lincoln within the meaning of the Low on Higher Education Institutions, but it is implemented as a specialization of the BA Computer Science program of the University of Latvia, on the basis of the cooperation agreement with University of Lincoln (see Annex "Līgums ar Linkolnas Universitati_Agreement with University of Lincoln").

In order to ensure the implementation of the Computer Science [Lincoln] specialization in the next accreditation period, the following study courses are included in the Bachelor's study program in Computer Science, each amounting to 5 CP: Big Data, Machine Learning (University of Lincoln), Parallel Programming, Cloud Computing, Cross-Platform App Development, Cyber Security.

All these corrections are justified and supported.

2.1.4. The SAR pp. 146 mentions that: „According to the European Commission's 2019 report, based on the Digital Economy and Society Index (DESI) on the digital competitiveness of the member states, the number of ICT specialists in Latvia has slightly increased since 2017, however, their percentage in the Latvian labor market is lower than in the EU as a whole. The report notes that the number of university graduates in the field of ICT in Latvia is increasing, reaching 4.8% of all graduates, and exceeds the EU average (3.5%). However, the number of trained ICT specialists lags behind the growing demand in the labor market. Also in the medium-term policy planning document "Digital transformation guidelines 2021-2027" (only in Latvian), several courses of action have been defined, the result of which would be highly qualified ICT specialists in Latvia who are able to develop excellent digital solutions and the shortage of labor force in the field of ICT would be reduced Just to ensure the natural replacement of the generations employed in the industry and to maintain at least the current number of the employed, at least the current number of graduates of computer science programs at Latvian universities is necessary. Along with the shortage of labor in

the field of ICT, there is no threat to the availability of jobs in the foreseeable future."
There is no doubt that in today's world, the role of ICT is fundamental in the economy and society.

The SAR pp. 146 mentions that "The data on 2017, 2018, and 2019 graduates of the Computer Science Bachelor's program and their employment, which were collected in 2022 by the Ministry of Education and Science (fiscal year - 2020), show that 85% of the 2017 graduates, 85% of the 2018 graduates, and 88% of the 2019 graduates are working..."

EN-IV-2.Annex.Statistics_stud_bac presents the enrolment data from the last years; on average there are 235 students enrolled in the first year of bachelor studies (full-time); 100 students are enrolled in the fourth year and 78 graduate. These numbers represent a high dropout of students, both during their studies and in failure to prepare/defend the bachelor dissertation.

The SAR pp. 148 mentions that "The dropout rate in the 1st year can be explained by an ill-considered choice of the program and lack of motivation, in the later years, however, by the problems of fully combining studies with work and personal reasons, thereby having academic debts and, after rotation, being shifted to paid study places, which not all students are able to pay for.". The SAR and the discussions with the University staff performed during the visit did not present a proper approach or significant interest in reducing the drop rate.

2.1.5. N/A

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The bachelor study program is well included in the study field. The bachelor study program can be delivered in both Latvian and English, targeting international students and a double diploma with the University of Lincoln. The bachelor study program title is compliant with the study field. The bachelor study program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the bachelor study program are justified and reasonable. The bachelor study program is fully justified and aligned with the requirements of the labor market.

Strengths
1. The bachelor study program offers 6 specializations, all well included in the field of studies.
2. The bachelor study program is well integrated with the industrial and research trends.
3. There is an international outreach, through the development of the bachelor study program integrated with the University of Lincoln, UK.

Weaknesses
1. The bachelor study programme exhibits a very high student dropout/ all-but-dissertation rate.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The FC bachelor study program provides six subprograms/specializations that suit different interests and career goals. These specializations include CE (Computer Engineering), CS (Computer Science), SE (Software Engineering), IT (Information Technologies), IS (Information Systems), and SE(EN) (Software Engineering Lincoln specialization).

The curricula of the study program are based on compulsory courses (which are common to all specializations), restricted elective, and free elective courses (SAR pp. 151 and Appendix IV-5). The compulsory courses are State examination and internship: 1. DatZN008 Bachelor Paper in Computer Science (12 CP); 2. DatZR002 Practice I [DAT6] (6 CP); 3. DatZR001 Practice II [DAT12] (12 CP). The courses Practice I and Practice II are in the amount of 18 CP in total, where 1 CP is intended for face-to-face lessons at the University of Latvia on the issues of the internship, while internship in industry, which is covered by the Internship Regulations, is in the amount of 17 CP. Course projects and workshops: 4. DatZ3169 Qualification Project (8 CP) Programming courses: 5. DatZ1165 Algorithms and Programming (6 CP); 6. DatZ1166 Software Development Fundamentals (5 CP); 7. DatZ1031 Web Technologies (2 CP); 8. DatZ2019 Web Technologies II (2 CP). Software development and project management: 9. DatZ2072 Software Engineering (6 CP); 10. DatZ4023 Information Technology Project Management (2 CP). Computer hardware and computer networks: 11. DatZ1164 Computer Architecture and computer engineering fundamentals II (3 CP); 12. DatZ1170 Computer networks I and Insight into Industry (3 CP). Operating systems: 13. DatZ1053 Operating Systems (2 CP). Databases and information systems: 14. DatZ1139 Databases and Information Systems 152 Fundamentals (3 CP). Classical Mathematics: 15. Mate1009 Algebra (2 CP); 16. Mate2005 Analytical Geometry (2 CP); 17. DatZ1143 Discrete Mathematics for computing 18. Mate1014 Calculus I (2 CP); 19. Mate2012 Probability Theory and Statistics (2 CP). Mathematical Foundations of Computer Science: 20. DatZ1037 Automata Theory (2 CP); 21. DatZ2029 Formal Grammars (2 CP); 22. Mate3044 Mathematical Logic (2 CP). General courses: 23. Ķīmi1059 Civil protection (1 CP); 24. Ekon1006 Principles of Economics (2 CP); 25. SDSK1067 Internet, Netiquette and Legal Regulation (2 CP); 26. KomZ3120 Communication and Cognitive Sciences (2 CP); 27. VadZ1091 Introduction to management (4 CP); 28. VidZ1032 Environment protection (1 CP).

The specializations are defined by their restricted elective courses (SAR pp. 152 and Appendix IV-5). All the courses are topical and aligned with the industry needs, and scientific trends, are inter-connected and complementary.

Students can choose their specialization at the beginning of the second semester. However, if their professional interests change during the study process, they can switch their specialization at the beginning of the sixth semester, as explained in SAR pp. 145-146: “Students of the Bachelor’s program must choose one of the specializations – the initial choice is made at the beginning of the 2nd semester, but later, at the beginning of the 6th semester, when the specializations' specific courses are mainly offered, the specialization can be changed to another, 146 based on the previous experience gained in the internship and according to individual student interests. Within the Computer Science [Lincoln] specialization, the choice is made as early as when entering the 1st year; it is implemented in English.” The SAR does not mention any specific methodology, but, the discussions with students (held during the visit to Riga on February 8-9) resulted that them knowing the way of choosing the specialty.

Overall, the FC bachelor study program provides students with the flexibility to choose a specialization that aligns with their interests and career goals while accommodating changes in their professional interests during the study process.

The program offers two study forms - full-time study and part-time study.

FC conducted a compliance analysis of the bachelor study program, which aimed to assess the bachelor study program adherence to the Regulations of the Cabinet of Ministers of Latvia No. 240 "Regulations on the state standard of academic education" (Annex: EN-IV-3.Annex. Compliance-with_education-standard-bac.docx of SER). The analysis covers such indicators as the program's

goals, achievable learning outcomes, credit points value, duration, mandatory and elective courses, thesis requirements, contact classes, compliance with mandatory laws (the Environmental Protection Law, Civil Protection, Disaster Management Law), degree awarded, opportunities for further studies, and evaluation procedures.

The compliance analysis was carried out correctly, and the results demonstrate that the bachelor study program fully complies with the state regulation.

FC has conducted an analysis of the mapping of bachelor study program study courses to the learning outcomes, which was documented in Annex: EN-IV-4..Annex-map-bac.xlsx of SER. The learning outcomes of the bachelor study program were defined according to the guidelines approved by the European Quality Assurance Network for Informatics Education (EQANIE) (Annex IV-9 of SER). The analysis was conducted accurately confirming that the learning outcomes of the bachelor study program are compliant with the bachelor study program goals.

FC has provided the plans for all specializations and education forms (full-time and part-time) of the bachelor study program, which covered all the necessary components of the program, including mandatory courses, restricted elective courses- specialization specific and specialization independent, practice, qualification paper, and bachelor paper. This analysis is documented in Annex EN IV-5 (EN-IV-5.Annex.Study plans - all specializations-bachelor-full time and part time.zip) of SAR and is accurate and compliant with the bachelor study program declared objectives and specialization directions.

Some courses, such as Mate6029 Selected topics in mathematical statistics for computer science (masters), and Mate3028: Theory of Probability and Mathematical Statistics (bachelor) cover some similar topics. Comments from the lecturers were, that these topics in the master's program are discussed deeper, with more technical details.

FC has provided the detailed course descriptions for the bachelor study program (Annex EN IV-8 : EN-IV-8.Annex.Course_desc-bac.docx of SAR). These descriptions include the courses' objectives, prerequisites, learning outcomes, and content, demonstrating that the content of the study courses is interconnected and allows for the achievement of bachelor study program objectives.

2.2.2. N/A

2.2.3. FC employs a variety of study methods to achieve the bachelor study program goals, including lectures, seminars, laboratories, project-based assignments, internships, and independent study. The lectures are recorded and are available for students to review in Moodle or Microsoft Teams environments. Experts had the opportunity to observe a demonstration of the Moodle environment for two different study courses at FC and found it to be professional and well-organized. The employed teaching methods seem to allow for achieving the learning outcomes and the aims of the courses and program. However, the organization of the e-study content differed between the two courses demonstrated, and it was unclear whether guidelines or best practices for creating e-study content existed. Additionally, some students expressed concerns during meetings during the assessment visit about the lecture recordings being up-to-date and maintained in the future.

FC uses a special seminar format to teach students about the ICT sector and modern scientific trends, as well as involve them in active participation in the study process through discussions,

presentations, and labs. Industry experts of the ICT sector are involved in creating and delivering seminars' content, which covers a range of modern trends such as artificial intelligence, deep learning in robotics, language technologies, blockchain technologies, and cyber-physical systems https://www.df.lu.lv/en/studies/bachelors-and-professional-studies/special-seminars/; (Accenture - Survival kit of the new digital era; ESI-stratup.lv - Business Lab) In assessment visit, both employers and students have expressed satisfaction with this study method.

FC also offers a wide range of specializations within the bachelor study program, allowing students to choose a subprogram that aligns with their career and professional interests (Annex EN-IV-5). As explained in SAR pp. 145-146: "Students of the Bachelor's program must choose one of the specializations – the initial choice is made at the beginning of the 2nd semester, but later, at the beginning of the 6th semester, when the specializations' specific courses are mainly offered, the specialization can be changed to another, 146 based on the previous experience gained in the internship and according to individual student interests. Within the Computer Science [Lincoln] specialization, the choice is made as early as when entering the 1st year; it is implemented in English." The SAR does not mention any specific methodology, but, the discussions with students (held during the visit to Riga on February 8-9) resulted that them knowing the way of choosing the specialty. This approach promotes student-centered learning and teaching principles.

Erasmus mobility program is available for bachelor study program students and contributes to student-centered- learning, however only a small part of the bachelor study program really uses this opportunity (17 students in last 6 study years (SER 154 page). More motivation and promotion activities from FC would be needed to change this situation and achieve at least the same number of outgoing Erasmus students as incoming Erasmus students.

To continuously improve the study process, FC conducts regular surveys among students and graduates, which provide valuable feedback. The corresponding teachers, study program directors, and field directors analyze the survey results, as outlined in Annex II-24, Annex II-25, Annex II-26, and Annex II-27 of the SAR. This commitment to gathering and analyzing feedback is evidence of FC's dedication to continuous improvement and ensuring a high-quality educational experience for its students.

2.2.4. As a result of the integration of the first level study program "Programming and computer network administration"41483 and this bachelor study program, students of the bachelor study program are provided with the internship program's opportunities. Bachelor study program inherits all benefits of the first level study program "Programming and computer network administration"41483 internships: a practical approach, active ICT industry involvement in the study process, and employment opportunities for students. For more details see this criteria analysis for the first-level study program "Programming and computer network administration"41483. SAR pp. 145 states that: "The Bachelor's study program is integrated with the 1st level professional study program "Programming and computer network administration" with a duration of 2.5 years. The content of the first two years of the studies is created by harmonizing the study courses of the Bachelor's program and the 1st level professional program. "

As explained in SAR pp. 151, "The courses Practice I and Practice II are in the amount of 18 CP in total, where 1 CP is intended for face-to-face lessons at the University of Latvia on the issues of the internship, while internship in industry, which is covered by the Internship Regulations, is in the amount of 17 CP. "

To facilitate the internship experience, the University of Latvia and its Faculty of Computing have

signed several contracts with Latvian companies over the past five years, with close to 400 contracts signed in total (as indicated in Annex II-19 of the SAR). Some examples of internship places are EMERGN, DELFI, CGI IT Latvia, Creative IT Development, DIVI grupa, iSoft Solutions, Tet, and ZZ Dats. There are no specific provisions for the internship of foreign students.

During the assessment visit, through meetings with students, employers, and internship providers, the experts received positive feedback on the compliance of real and documented practices.

2.2.5. N/A

2.2.6. The process of choosing the subject of the Bachelor's thesis for students is well organized, and support from the FC side is available (SER, pp 157-160; inputs from the meeting with students and study program directors).

Both FC teachers and IT industry experts are involved in the Bachelor thesis supervision process. According to SER, on average 17% of SP2 students had external supervisors for Bachelor theses in the last 6 study years (Table IV-3, 158 pages of SER).

Requirements for the development and defense of final theses are defined by FC. In accordance with the requirements, the evaluation takes into account the quality of the thesis, research, and innovation components, and the presentation and reasoning skills of students (SER, pp 157-158).

Almost all graduates of bachelor study programs have their employment within the ICT industry by the time of writing and defending their theses (inputs from interviews in assessment visits with students, study program directors, and employers representatives). There are no problems for students to choose the bachelor thesis topic within the study program scope and according to FC requirements.

The evaluations of the commission for the defense of Bachelor's theses by academic years are provided. The average grade ranged from 7.65 to 7.91 on a 10-point scale (Table IV-4, page 160 of SER).

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The compliance analysis was carried out correctly, and the results demonstrate that the bachelor study program fully complies with the state regulation of the Cabinet of Ministers of Latvia No. 240 "Regulations on the state standard of academic education",

FC employs a variety of study methods to achieve the bachelor study program goals, including lectures, seminars, laboratories, project-based assignments, internships, and independent study. The lectures are recorded and are available for students to review in Moodle or Microsoft Teams environments. However, the organization of the e-study content differed between the courses, and it was unclear whether guidelines or best practices for creating e-study content existed. A policy for keeping e-study contents up-to-date should be created.

FC uses a special seminar format to teach students about the ICT sector and modern scientific trends, as well as involve them in active participation in the study process through discussions,

presentations, and labs.

FC also offers a wide range of specializations within the bachelor study program, allowing students to choose a subprogram that aligns with their career and professional interests. This approach promotes student-centered learning and teaching principles.

Erasmus mobility program is available for bachelor study program students and contributes to student-centered learning, however, only a small part of the bachelor study program really uses this opportunity. More motivation and promotion activities from FC would be needed to change this situation and achieve at least the same number of outgoing Erasmus students as incoming Erasmus students.

The bachelor study program is integrated with the 1st level professional study program and inherits all benefits of the first-level study program “Programming and computer network administration” 41483 internships: a practical approach, active ICT industry involvement in the study process, and employment opportunities for students.
The process of choosing the subject of the Bachelor’s thesis for students is well organized, and support from the FC side is available.

Requirements for the development and defense of final theses are defined by FC.

Strengths
1. FC uses a special seminar format to teach students about the ICT sector and modern scientific trends, as well as involve them in active participation in the study process through discussions, presentations, and labs.
2. FC also offers a wide range of specializations within the bachelor study program, allowing students to choose a subprogram that aligns with their career and professional interests. This approach promotes student-centered learning and teaching principles.
3. Bachelor study program is integrated with the 1st level professional study program and inherits all benefits of the first level study program “Programming and computer network administration” 41483 internships: a practical approach, active ICT industry involvement in the study process, employment opportunities for students.

Weaknesses
1. The organization of the e-study content differed between the courses, the common policy for keeping e-study content up-to-date is not available
2. Low number of students who participate in the Erasmus outgoing activities

Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)

1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

Assessment of compliance: Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The material, technical, information, and study provision are all used in all levels of this study

field, therefore do not differ between included study programs. A more thorough analysis can be seen at 1.3. Section of this report.

Mainly the study process is conducted at Raiņa Bulvāris 19. At the main premises, there are available larger auditoriums (up to 130 places), 3 seminar rooms, 4 computer classes (20-25 places), a Linux center (20 places), and “DF LAB”, that serves as a more “creative space” for students to work on their practical works/thesis, etc. There are available 3D printers, Speedy 400 laser cutters, soldering stations, and others. Auditoriums, seminar rooms, and computer classrooms are fully equipped with projectors, portable computers, desktop computers, wireless Internet, sound system, and electricity connection points for student workplaces (partially) (SAR p.56-57).

In the same building, there is an available library that provides the methodological and informative provisions needed for the implementation of this study program. (SAR p.59) There are two e-studies environments available – estudijas.lu.lv and edu.lu.lv, that provide access to all the needed resources, grading, etc (SAR p.60).

The internships are offered at various institutions that offer practical skills. In the assessment visit, and meeting with employers it was confirmed that all the internships are paid. And in the meeting with students, it was confirmed that the internships provide the needed practical knowledge and the duration is optimal.

Taking into account all the previously mentioned, the study, material, and technical provision is sufficient and provides the possibility to ensure a high-quality study process.
The finances are planned locally at the FC and planned together rather than separated specifically by the study program (SAR p.55). The experts believe that this manner is sufficient since most materials are planned for all the programs and therefore the financial provision is sufficient.

2.3.2. N/A

2.3.3. The calculated state budget grant from the Ministry of Education and Science in the 2021/2022 academic year is 2445 EUR for full-time regular studies. The tuition fee for studies in the Latvian language is 2000 EUR/year. Candidates to the study program every summer can apply only for a state budget-funded study place. Only those who have not passed the study semester successfully, become fee-paying students. The fee for studies in English is 2900 EUR/year, and studies in Lincoln in English 4200 EUR/year. The program is implemented only as a full-time regular study program (SAR p.161).

When planning the costs, all general indirect costs are deducted for any study program. The calculated cost of the full-time program is 2441 EUR per student per year, and the total cost of the program is 927 580 EUR per year. The largest expenditure is planned for salaries: teaching staff (38.6%) and general (27.1%). Indirect costs come up to 26%, infrastructure 5.3%, and goods and services make up 3%. Summing up the revenues of the program (state grant) - 929,100 EUR and the program expenses - 927,580 EUR for 380 budget students, the result of the study program is positive (SAR p.162).

The sensitivity analysis graph of cost based on the number of students shows that with the study fee of 2450 EUR/year, sustainability is achieved at around 380 students. The minimum number of enrolled students is stated as 25. From the available statistics (IV-2 Annex), the number of active

students in the program is from 565 (in 2021/2022) to 603 (in 2018/2019), which shows that the program is rentable at the current cost with 380 budget places. The matriculated students usually differ between 219 and 228 which is above the minimum number and therefore sufficient.

In Annex IV-2 it is stated that the main reasons for not continuing their studies are: not enough motivation to continue (49%), personal reasons (45%), academic depts (34%), and can't combine with work (29%), etc. Since the high dropout rates, these main reasons should be addressed.
The experts believe that the funds are sufficient and allow the development of the bachelor study program

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The study provision is sufficient for the implementation of the bachelor study program. Studies are held at the faculty building that offers auditoriums with computers. The methodological and informative resources are accessible to students via two main websites and are sufficient. The internships provide the needed practical skills.
The fee is lower as it is calculated by the state funding, the students in Latvian are only matriculated in state budget places. The finances are balanced. The bachelor study program is rentable and the number of students exceeds the minimal number.

Strengths
1. There is a large variety of equipment available for practical classes.
2. “DF LAB” project studio is available for students to work on their various types of practical research and laboratory work during or outside of their studies.
3. The internship places are mostly paid.

Weaknesses
1. The dropout rates are high.

Assessment of the requirement [6]

1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

Assessment of compliance: Fully compliant

The resources are sufficient for the implementation of the bachelor study program. The finances are balanced.

2.4. Teaching Staff

Analysis

2.4.1. The SAR (p.164-166) and attached Annexes II-11 “List of teachers involved in the implementation of programs of the study direction (lecturing in study courses) in 2021” and IV-10 “Certification by the Head of Direction” affirm that the qualification of the teaching staff complies with the requirements for the implementation of the bachelor study program and the requirements set forth in the Law of Higher Education Institutions and is appropriate for bachelor study program

implementation, allow to achieve the aims and ensure the learning outcomes of the study program in both Latvian and English languages.

The implementation of the bachelor study program is ensured by 63 lecturers (18 professors, 10 associate professors, 19 assistant professors, 3 lecturers, 11 teachers (6 of them with a doctor's degree)), 87% of them with a doctor's degree, but others with a master's degree. 49 teaching staff members are recruited in the Faculty, 43 (87.8%) of whom are elected to academic positions (SAR, p.160). Other unelected members (professionals from the industry or doctoral students) of the Faculty are involved in the teaching process as teachers.

In accordance with Article 55, Paragraph 1, Clause 3 of the Law on Higher Education Institutions, no less than five professors and associate professors elected at the relevant higher education institution participating in the implementation of the compulsory part and the limited optional part of the academic study programs. This requirement is fulfilled in the case of the bachelor study program.

SAR states that one visiting associate professor from the Royal University of Technology (Sweden) also participates in the implementation of the studies (p.164).

10 members of academic staff (Prof./Assoc.prof.) involved in the implementation of the bachelor study program participated in the projects as project managers/coordinators, scientific /program leaders, lead researchers/performers/experts, researchers /experts that ensure the inclusion of new findings, knowledge and gained research experience in study courses to improve their content.
SAR states that academic staff from other faculties (9 out of 63) is involved in the implementation of the study program as well. Among them, there are 6 members with a doctoral degree (66.7%) and the others with a master's degree who teach individual courses in the relevant field, for example, in economics, mathematics, chemistry, and geography (SAR, p.164).

During the reporting period, the implementation of the current program in English was started, but the students of the English group are able to study only one of the specializations "Software Engineering" (SAR, p.165). For this reason, fewer lecturers are involved in the implementation of the program in English compared to the Latvian group. In total, 39 lecturers teach in the English group (including 7 lecturers from other faculties), i.e., 10 professors, 8 associate professors, 9 assistant professors, 2 university lecturers, as well as 8 instructors (3 of the instructors have a doctor's degree). 7 members of the mentioned university teaching staff teach only in the English group (SAR, p.165).

To ensure the same quality of content and teaching quality, lecturers who are teaching the relevant course in the Latvian group were attracted to teach in English flow.
The involvement of many university lecturers is justified by the fact that lecturers teach study courses that correspond to their field of research, for example, quantum algorithms, Perceptual and Cognitive Systems, Human-Computer Interaction, mathematics, etc. It was evidenced by the attached annexes II-17 on teaching staff publications, II-16 "Participation of teachers in projects marked by importance" and the study courses taught by them, which ensures the up-to-date content of study courses. In study courses related to the latest technologies, lecturers use their practical experience gained in projects or industries (SAR, p.165-166).

To ensure compliance with the requirement of English language knowledge level (at least B2-level knowledge) the instructors were changed for some courses in the English group (SAR, p.165).
The qualification of teaching staff is assessed upon election to academic positions according to the

procedures set out in the UL regulatory documents, for example, “Regulations on academic and administrative positions at the University of Latvia” (Confirmed with the LU Senate 31.01.2022 decision no. 2-3/11). The aforementioned regulation states that, in compliance with the need to acquire practical skills and knowledge, the position of associate professor and assistant professor in profile subjects of professional study programs can also be held by a person with higher education without a scientific degree, but the position of a lecturer or assistant - also without an academic degree, if he has a degree for the subject being taught relevant sufficient practical experience.

But it should be noted that UL sets higher requirements for the personal education level and scientific experience and since May 2015, only persons with scientific degrees PhDs have been elected to pedagogical academic positions in the Faculty of Computing (there are no elected lecturers and assistants in the faculty) (SAR, p.165). This strategy limits the pool of potential teaching staff.

2.4.2. To ensure the qualified, scientific experienced academic staff and high-quality implementation of the study program since 2015, only persons with scientific degree PhDs have been elected to pedagogical academic positions (professor, associated professor, assistant professor) in the Faculty of Computing (SAR, p.164).

During the reporting period, there was a change in the composition of the elected academic staff. Of all the academic staff elected in the reporting period, professors (5), associate professors (10), and university lecturers (6) were elected to the respective position for the first time. As SAR states, there were also 2 cases where lecturers showed good results in teaching and met the qualifications, i.e. during the reporting period, they were elected for the first time to the position of assistant professor, and later also to the position of associate professor (SAR, p.166).

The requirements set for the candidates for an academic position (professor) are set in accordance with the “Regulations on academic and administrative positions at the University of Latvia” (Confirmed with the LU Senate 31.01.2022 decision no. 2-3/11), the Law of Higher Education Institutions, the Law of Scientific Activity and other regulatory enactments.

Faculty is actively involving doctoral students in the teaching process as non-elected lecturers during their doctoral studies that were approved by doctoral students and faculty management during the visit. Thus doctoral students gain experience in academic work, and after obtaining the degree, they can candidates to be elected to the position of assistant professor (SAR, p.166).

The age distribution of elected academic staff at the Faculty of Computing who teach in the Latvian group of the Bachelor’s program reflects a natural renewal of the teaching staff, which is ensured by the possibility to be elected to an academic post after obtaining a degree and engaging in the teaching work (p.165).

The UL purposefully takes measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation of the study program.

2.4.3. N/A

2.4.4. According to appendix IV-10. “Certification by the Head of Direction the 23 members of the

academic personnel involved in the implementation of the study program “Computer Science” (current code 43483) and CV, the scientific activity of academic staff corresponds to the recommendations set in the Law on Higher Education Institutions paragraph 3 of the first part in Article 55. This fact was verified by reviewing the CVs of the teaching staff and confirmed by experts.

2.4.5. SAR states that study courses are developed and taught by different persons. The course development process includes separate activities (SAR, p.167).

1. The author of the study course consults the program director about the prior knowledge for the course, as well as about possible overlaps with other courses in the program.
2. It is evaluated, which semester of the study program the course should be included in, based on the necessary prior knowledge.
3. The developers of the study course prepare the content of the study course and its description. The responsible teaching staff is also involved in the preparation process.

The program also includes several study courses, which are taught by several members of the teaching staff, not including the lecturers involved in conducting practical work or correcting students’ tests. The teaching staff involved in study course implementation cooperate with each other and agree on the topics taught by each lecturer, the evaluation criteria of the course, the sequence of the content, and the presentation of topics (SAR, p.167).

According to the regulatory document “DEVELOPMENT AND UPDATE ORDER OF STUDY COURSES AT LATVIA UNIVERSITY” (approved by LU on 10.08.2018. order No. 1/277, Annex II-4) the study course must be updated at least once during the current accreditation period. In addition, SAR states that updating the content of the study courses should take place at least once every three years, but if necessary, also before each study semester. The updating of study course content is carried out in cooperation, of course, developers and responsible teaching staff (SAR, p.112).

During interviews in assessment visits with teaching staff, the experts did not gain confidence that teaching staff actively renew the content of study courses and their programs. Several faculty members mentioned existing procedures for developing new courses. But only a few noted that they have renewed the curriculum of study courses based on the results of the mandatory survey of students and students' comments.

The information provided by the teaching staff, and faculty management during the interview and demonstration of the Moodle system shows the active and successful use of the e-study system (Moodle, MS Teams) in the study process and its organization. In addition, students confirmed during the interview that all the necessary study materials for successful study course learning are provided in the Moodle system.

During the interviews, students mentioned that there is a study course that is organized and learned on the basis of student reports. In the expert's opinion, a student's report could be one of the student's independent works. But the study course should also include other learning methods and test types, such as lectures, seminars, laboratory work and practical work, independent work, etc.

During the interviews with graduates, it was mentioned that there exists an overlap in the content of study courses related to the mathematics taught in the master study program “Computer science” (code 45483) and the bachelor study program “Computer science” (code 43483). While the director

of the Master's study programme mentioned that teaching staff continues to teach related or advanced study courses of the same direction at the master's level. This indicates insufficient communication between study course developers in different levels of studies (bachelor and master) or inappropriate content of master study courses while the requirements and results of master level must be higher.

Conclusions on this set of criteria, by indicating strengths and weaknesses

Conclusions
The implementation of the bachelor study program is ensured by competent academic staff. Although the necessary procedures for the engagement and recruitment of staff have been established, an established procedure prevents persons without a doctoral degree from being elected to an academic position. The study process is successfully implemented in the UL. Academic staff actively use Moodle system to provide necessary materials for the study course learning. There exists an overlap in the content of study courses taught in the bachelor study program “Computer science” (code 43483) and the master study program “Computer science” (code 45483). This indicates insufficient communication between study course developers in different levels of studies (bachelor and master) or inappropriate content of master study courses while the results of master level must correspond to the EQF level 7. There is a study course that is organized and learned on the basis of student reports which is not enough for achieving study results.

Strengths:
1. The qualification of the teaching staff is appropriate for bachelor study program implementation and to achieve the aims and ensure the learning outcomes of the study program in both Latvian and English languages.
2. The competencies of the academic staff of the study field are high.
3. Faculty involves doctoral students in the teaching process during their doctoral studies. Doctoral students have opportunities to gain experience in academic work, and after 4. obtaining the degree candidate are elected to the position of an assistant professor or higher.
5. The e-studies system is used actively both by academic staff and students and provides students with sufficient necessary materials.

Weaknesses
1. There is a lack of a systematic, regular process for updating study courses. Only a few members of the teaching staff noted that they have renewed the curriculum of study courses based on the results of the mandatory survey of students.
2. Some teaching staff use an insufficient range of methods that would promote high-quality presentation and learning of the course material and topics, as well as achieving course results.
3. There is insufficient communication between study course developers in different levels of studies (bachelor and master). There are study courses at the master level that repeat the content taught in the bachelor study program of the FC.

Assessment of the requirement [7]

1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

Assessment of compliance: Fully compliant

The qualification of the academic staff complies with the requirements specified in the Law of

Higher Education Institutions, the Law of Scientific Activity, and UL regulatory documents, as well as with the conditions for the implementation of the bachelor study program. But there are some shortcomings related to the implementation, e.g. insufficient range of methods used in the teaching process and overlapping content of study courses in master and bachelor level programs.

2.5. Assessment of the Compliance

Requirements

1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard

Assessment of compliance: Fully compliant

The attached document (EN-IV-3.Annex. Compliance-with_education-standard-bac.docx) "Compliance of the study program Bachelor's academic study program "Computer Science" with the national education standard" confirms that academic bachelor study programme complies with the Minister Cabinet Regulation Nr.240 "Noteikumi par valsts akadēmiskās izglītības standartu"

2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

Assessment of compliance: Not relevant

3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561 , Paragraph two and Section 562 , Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Fully compliant

Attached study course descriptions (Annex EN-IV-8.Annex.Course_desc-bac.docx) are prepared in languages (Latvian and English) in which the study program is implemented and complies with regulations set forth in Law on Higher Education Institutions. But there exists an overlap in the content of study courses taught in the master study program "Computer science" (code 45483) and the bachelor study program "Computer science" (code 43483). The requirements and results of the master level must be higher.

4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

Assessment of compliance: Fully compliant

The provided Diploma samples (IV-1. annex Dipl_pielik.zip) comply with the criteria set in the Minister Cabinet regulation No.202 "Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus". But faculty management should pay careful attention to the information mentioned in Clause 16. The size of the diploma, except for the cases mentioned in Clause 17 of these regulations, must be an A5 page (148 x 210 mm).

5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

Assessment of compliance: Fully compliant

The attached Certification by the Head of Direction (Annex: IV-10. Certification by the Head of Direction.edoc) affirms that the academic staff of the academic study program complies with the requirements set forth in the Law on Higher Education Institutions.

6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Not relevant

7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

Assessment of compliance: Not relevant

8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

Assessment of compliance: Fully compliant

The attached Annex II-13. annex. Certificate of the Head of the study direction regarding state language proficiency of teaching personnel.edoc. Certificate of the Head of the study field regarding state language proficiency of teaching personnel (signed on 09.10.2022) affirms that the knowledge of the official/national language of the academic staff involved in the implementation of the study program complies with the Regulations on the extent of knowledge of the national language and the procedure for testing the knowledge of the national language for performing professional and official duties.

9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

Assessment of compliance: Fully compliant

The attached Certificate of the Head of the study direction regarding English language proficiency of teaching personnel (Signed on 09.10.2022, Annex II-13a) and List of teachers involved in the implementation of programs of the study field (lecturing in study courses) in 2021 (Annex II-11) affirm that English knowledge level of the teaching staff involved in the implementation of the study program is B2 and higher.

10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

Assessment of compliance: Fully compliant

The attached Templates of Study agreements (II-3.annex. Templates of study agreements.zip) comply with the requirements set in the Minister Cabinet regulation No.70 “Studiju līgumā oblgāti ietveramie noteikumi”.

11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

Assessment of compliance: Fully compliant

The Agreements with Riga Technical University on students take over in case of cancellation of study programs (see II-33. annex. Agreements with RTU on students take over in case of cancellation of study programmes.zip.) affirms that students are provided with opportunities to continue their education in Riga Technical University professional bachelor (first cycle) academic bachelor study program "Computer systems" or academic bachelor study program "Information Technology" if the implementation of the study program is terminated.

12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme's license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

Assessment of compliance: Fully compliant

The attached Annex II-32 (II-32. annex. Proof of compensation by the Rector.docx) "Proof of compensation by the Rector" (Riga, 28.12.2021. , No 1-13/831) affirms that students are guaranteed compensation for losses if the study program is not accredited or the study program's license is revoked due to the actions of the higher education institution and the student does not wish to continue studies in another study program.

13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

Assessment of compliance: Not relevant

14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

Assessment of compliance: Not relevant

Assessment of the requirement [8]

1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

Assessment of compliance: Fully compliant

The bachelor study program complies with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme

Conclusions
The bachelor study program is well included in the study field and its title is compliant with the study field. The bachelor study program can be delivered in both Latvian and English, targeting international students and a double diploma with the University of Lincoln. The bachelor study program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the bachelor study program are justified

and reasonable. The bachelor study program is fully justified and aligned with the requirements of the labor market.

FC employs a variety of study methods to achieve the bachelor study program goals, including lectures, seminars, laboratories, project-based assignments, internships, and independent study. However, the organization of the e-study content differed between the courses, and it was unclear whether guidelines or best practices for creating e-study content existed. A policy for keeping e-study contents up-to-date should be created.

FC offers a wide range of specializations within the bachelor study program, allowing students to choose a subprogram that aligns with their career and professional interests. This approach promotes student-centered learning and teaching principles.
Erasmus mobility program is available for bachelor study program students and contributes to student-centered- learning, however only a small part of the bachelor study program really uses this opportunity.

The resources are sufficient for the implementation of the bachelor study program. The finances are balanced.

UL sets higher requirements for the personal education level and scientific experience that limits the pool of potential teaching staff. Only persons with scientific degree PhDs have been elected to pedagogical academic positions in the FC.

Strengths
1. The academic bachelor program offers 6 specializations, all well included in the field of studies.
2. The bachelor program is well integrated with the industrial and research trends.
3. There is an international outreach, through the development of the program integrated with the University of Lincoln, UK.
4. The qualification of the teaching staff is appropriate for bachelor study program implementation and to achieve the aims and ensure the learning outcomes of the study program in both Latvian and English languages.
5. FC offers a wide range of specializations within the bachelor study program, allowing students to choose a subprogram that aligns with their career and professional interests. This approach promotes student-centered learning and teaching principles.
6. Bachelor study program is integrated with the 1st level professional study program and inherits all benefits of the first level study program “Programming and computer network administration”41483 internships: a practical approach, active ICT industry involvement in the study process, employment opportunities for students.

Weaknesses
1. The program exhibits a very high student dropout/ all-but-dissertation rate.
2. There is a lack of a systematic, regular process for updating study courses.
3. Some teaching staff use an insufficient range of methods that would promote high-quality presentation and learning of the course material and topics, as well as achieving course results.
4. There is insufficient communication between study course developers in different levels of studies (bachelor and master). There are selected topics in some study courses at the master level that partially repeat the content taught in the bachelor study program of the FC (e.g., Mate6029 Selected topics in mathematical statistics for computer science and Mate3028: Theory of Probability and Mathematical Statistics selected topics).
5. The organization of the e-study content differed between the courses, the common policy for

keeping e-study content up-to-date is not available.
6. A Low number of students participate in the Erasmus outgoing activities.

Evaluation of the study programme "Computer Science"

Evaluation of the study programme:

Excellent

2.6. Recommendations for the Study Programme "Computer Science"

Short-term recommendations

1. Consider implementing a consistent plan for the reduction of the student drop-out rate.
2. Review teaching methods, applied in the study courses, and suggest lecturers include novel teaching methods and practices.
3. Review, and if required, modify the content of the potentially overlapping course (e.g., Mate6029 Selected topics in mathematical statistics for computer science (masters), and Mate3028: Theory of Probability and Mathematical Statistics (bachelor)).

Long-term recommendations

1. Consider the implementation of a timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation, targeting the statistics of employers.
2. Consider the documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
3. Address the main drop-out reasons to lower the number of drop-outs.
4. Implement a systematic, regular process of updating study courses including renewal of the curriculum of study courses at least once every two years.
5. Consider the possibility of hiring, as well as electing a person who does not have a science degree, but has knowledge in the taught subject and experience in the relevant field gained in the industry, to the position of assistant professor or associate professor.
6. Consider hiring or electing a person with the appropriate academic degree for the position of lecturer.

II - "Computer Science" ASSESSMENT

II - "Computer Science" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" (study field) includes the academic master study program “Computer Science” 45483 (master study program) with the goal [SAR, pp. 114] to “prepare highly qualified export-capable IT specialists and managers for practical work in business

companies and state institutions, to provide the industry with academically educated specialists prepared for scientific and pedagogical work in the following specializations (branches of study):
1. Computer Science (CS) – researchers and lecturers,
2. Software Engineering (SE) – leading programmers and software project managers,
3. Information Technologies (IT) – leading computer network specialists and project managers,
4. Information Systems (IS) – leading database and information systems specialists and project managers,
5. Computer Engineering (CE) – leading specialists and project managers of embedded systems,
6. Bioinformatics (BI) – leading specialists in bioinformatics,
7. Advanced Programming (AP) – developers and programmers of complicated algorithms."

The title of the master study program, its goal, and intended specializations fits perfectly the study field.

2.1.2. The master's study program provides the degree of "Master's Degree of Natural Sciences in Computer Science". The code of the program is 45483, with the last 3 numbers (483) standing for Computer systems, databases, and computer networks according to the classification of Latvian education which can be accessed here: https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju. The program is implemented in several versions: full-time, 2 years, 80 credit points, part-time, 3 years, 80 credit points in both Latvian and English, and full-time, 1 year, 40 credit points, full-time in Latvian [SAR pp. 115-118]. The scope, duration, and language are reasonable and justified.
Annex V-3 (Annex V-3. Diploma with annexes.zip) contains a sample of the diploma issued for completing the study program and its annexes following the Regulations of the Cabinet of Ministers of 16.04.2013 No. 202 "The procedure for issuing state-recognized documents certifying higher education".

A study contract sample according to the Regulations of the Cabinet of Ministers of 23.01.2007 No. 70 "Terms and conditions that must be included in the study contract" are attached in Annex II-3 (II-3.annex. Templates of study agreements.zip).

The opinion of the Council of Higher Education following Article 55 Section 2 of the Law on Higher Education Institutions is attached in Annex V-11.

SAR pp. 122 describes the admission procedure for the master program, in all its variants: "It should be especially noted that the approved admission conditions provide the opportunity to study in the program not only for computer science bachelors but also for bachelors of other related fields, i.e., mathematicians, physicists, engineers, management scientists, economists, etc. First, we ask candidates to read this information: https://www.df.lu.lv/fileadmin/user_upload/LU.LV/Apaksvietnes/Fakultates/www.df.lu.lv/mag_progr_saturs_2022.pdf (only in Latvian). and get familiar with detailed information about studies in the program, and assess their own interest and adequacy for the studies. After that, through meetings, we discuss the main question: whether the applicant's previous education and work experience in the three main areas (mathematics, programming, and working with databases) is sufficient for successful studies in the program. If the student still wishes to study despite insufficient competence, the missing competencies must be obtained either before or simultaneously with the studies in the program. A special situation is in the specialization "Bioinformatics" - only students with Bachelor's degrees in Computer Science are admitted. The study plan of this specialization includes biology study courses in the amount of 30 CP (classes are held at the UL Faculty of Biology) and computer science courses in the amount of only 26 CP. Only a bachelor of Computer Science

can apply for this degree, but not a bachelor of related fields who would have completed only 26 CP of computer courses. There is also a special situation in the one-year study version – in it, we plan to admit only graduates of four-year computer science bachelor's programs"

The aim of the study program and its outcomes are not specifically noted in the SAR; however the diploma supplement (Annex V-3. Diploma with annexes.zip) mentions that: "Aim of the study program: to educate for practical work in companies and national authorities high-skilled export-capable computer experts and managers, provide a sector with academically educated, scientific and pedagogical professionals. Learning outcomes: according to Euro-Inf Programme Outcomes for informatics and related programs (2015)"

Graduates of the master's study program work mainly in the IT industry.

The interconnection of the program name, code, obtainable degree, objectives, tasks, and learning outcome is easy to determine. The title of the master study program precisely characterizes the study field, the goal, and the outcomes of the master study program. All parameters of the study program are interrelated.

2.1.3. The framework of the master study program's objective, tasks, and learning outcomes, compared to the existing version of the program, have not been changed. [SAR, pp. 119]. Yet, several modifications were performed in the curricula, in the implementation of the curricula, and in the type of studies.

Curricula modifications.

The SAR pp. 120 shows that "Starting from the spring of 2018, the Master's program has offered a new industry-relevant course "DatZ6082 Big Data Technologies" (4 CP). The topics of the course correspond to the field of the research work of both course lecturers. From the fall of 2018, the program has offered a new sub-program, which is unique in Latvia, i.e., "Bioinformatics", which is implemented in cooperation with the UL Faculty of Biology and is intended as a continuation of the Computer Science Bachelor's programs. Students of this subprogramme learn a set of specially selected biology courses in the amount of 30 CP, computer science courses in the amount of 26 CP, as well as defend a Master's coursework and a Master's thesis on bioinformatics.

Starting in the spring of 2020, the Master's program has offered a new industry-relevant course "DatZ6090 Computer security and vulnerabilities" (4 CP). Starting in the autumn of 2021, the Master's program has offered a new industry-relevant course "DatZ7101 Open Government Data in a data-driven world" (2 CP)."

Starting from the 2022/2023 academic year amendments are planned to the compulsory part of the program: a) the course "DatZ5057 Data Processing Systems" is included to replace the courses "DatZ6009 Software Quality" (2 CP) and "DatZ6015 Applied Cryptography" (2 CP). The mentioned two courses have proved to be too difficult for students coming from non-computing undergraduate programs. b) the entire compulsory part in the amount of 24 CP is also allocated to the sub-program "Bioinformatics". In the existing version of the program, only 8 CPs out of 24 were allocated to this sub-program. This amendment has a serious drawback, i.e., now only 2 CP remain for the free elective part of the specialization.

Implementation modifications.

As the SAR shows on pp. 120 the university will introduce a 1-yer version of the master program: “In the new version of the program, we also offer a one-year full-time regular study option in Latvian. The volume of studies has been reduced to 40 CP, including 20 CP for developing a master’s thesis. Only one specialization is provided, i.e. “Advanced Programming”, which is focused on the development and programming of complex algorithms. In such one-year studies, we will admit only the graduates of a four-year bachelor program in the field of computer science.”

In the fall of 2017, in response to the proposal of the company Accenture Latvia, the program offered the possibility (during or outside of studies) to obtain Big Data Analyst Certificate. The certificate is issued by the Faculty of Computing (it bears the signatures of the Chairman of the Faculty Council and the dean). To receive the certificate, the following study courses of the program must be successfully completed (each in the amount of 4 CP): Data 120 processing systems (optional introductory course), Data mining algorithms, Selected topics in mathematical statistics for computer science, Selected Topics about Data Warehouses, Big data technologies, Deep machine learning.

Type of studies modifications:

The SAR pp. 120 shows that “In the new version of the program, we offer a part-time regular studies (NLK) option. The admission requirements for NLK will be identical to those for full-time regular (PLK) studies. The decision to announce admission to NLK studies has not yet been made, but this decision will not affect the operation of the program and will not cause additional costs, because, in the NLK study version we offer, students will study and complete all study courses together with PLK students. No specific course versions will be needed for NLK. NLK and PLK will use common lecture schedules for the fall and spring semesters. Only the study plans differ, in which the study load in PLK is divided into 4 semesters, while in NLK - the same study load is divided into 6 semesters. The load of one NLK semester is then 12 CP (in the first five semesters), which would be more convenient for working students than the 20 CP semester load of PLK. The exception is the sixth semester when a master's thesis in the amount of 20 CP must be developed. See details. in Annex V-9. Thus, in the NLK studies the number of contact hours in study courses corresponds to PLK, but the 121 total number of CP in the academic year is less than 40 CP and the number of contact hours is less than 40 academic hours per week.”

Mostly all these corrections are justified and supported; the one-year version of the master program, delivered under the same title (“Computer Science) as the 2-year version seems not well suited (since the content of the first-level study program is significantly different from the content of 2 years programs, as there are only specialization courses and no fundamental courses, common to all Computer Science directions).

The SAR chapter dedicated to the master program (pp. 114-137) does not mention anything about the student options for specialization and if/how this option can be changed.

2.1.4. The SAR pp. 123 references the economic context described in section 3.1.3 of the SAR corresponding to the bachelor study program “Computer Science”; on page 146 the SAR mentions that: „According to the European Commission’s 2019 report, based on the Digital Economy and Society Index (DESI) on the digital competitiveness of the member states, the number of ICT specialists in Latvia has slightly increased since 2017, however, their percentage in the Latvian labor market is lower than in the EU as a whole. The report notes that the number of university graduates in the field of ICT in Latvia is increasing, reaching 4.8% of all graduates, and exceeds the EU average

(3.5%). However, the number of trained ICT specialists lags behind the growing demand in the labor market. Also in the medium-term policy planning document “Digital transformation guidelines 2021-2027” (only in Latvian), several courses of action have been defined, the result of which would be highly qualified ICT specialists in Latvia who are able to develop excellent digital solutions and the shortage of labor force in the field of ICT would be reduced Just to ensure the natural replacement of the generations employed in the industry and to maintain at least the current number of the employed, at least the current number of graduates of computer science programs at Latvian universities is necessary. Along with the shortage of labor in the field of ICT, there is no threat to the availability of jobs in the foreseeable future.”

There is no doubt that in today’s world, the role of ICT is fundamental in the economy and society.

Graduate employment data is presented in SAR pp. 123: “the Ministry of Education and Science (program code 45481, fiscal year – 2019): 2017: 43 graduates, 40 of them employed, 0 unemployed, average annual income – 32,910 EUR. 2018: 43 graduates, 40 of them employed, 0 unemployed.”

Annex V-5. Student Statistics annex V2 presents the enrolment data from the last years; on average there are 112 students enrolled in the first year of master studies (full-time); 62 students are enrolled in the second year and 38 graduate. These numbers represent a high dropout of students, both during the studies and in failure to prepare/defend the dissertation.

The SAR pp. 125 presents an analysis of the dropout reasons, finding that the main reason is “cannot pass the academic obligations”. The SAR pp. 124 also declares that „Basically, the 1st semester serves us as an “extended entrance exam”, which tests students’ motivation, ability to study intensively (while simultaneously working in industry), as well as previous preparation in computer science and mathematics.” The SAR and the discussions with the University staff performed during the visit did not present a proper approach or significant interest in reducing the drop rate.

2.1.5. N/A

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The master's study program fits well the study field. The master's study program can be delivered in both Latvian and English, targeting international students. The master study program title is compliant with the study field. The master's study program provides a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the master study program are justified and reasonable. The master study program is fully justified and aligned with the labor market requirements.

Strengths
1. The master's program offers 6 specializations, all well included in the field of studies.
2. The master's program is well integrated with the industrial and research trends.

Weaknesses:
1. The one-year version of the master program provides less content than the two-year version for the same final diploma/title.
2. The master study program exhibits a very high student dropout/ all-but-dissertation rate.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The master study program of FC offers a wide range of specializations, with six sub-programs to choose from: Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering. These specializations are available in both full-time and part-time study modes, allowing students to choose the option that best fits their needs and schedules. The specializations are topical and of interest to the labor market; they are aligned with scientific trends.

FC conducted a compliance analysis of the master study program, assessing its adherence to the Regulations of the Cabinet of Ministers of Latvia No. 240, which outline the state standard of academic education (Annex V-6. Compliance with education standard V2.docx of SER). The analysis covered various indicators, including the program's goals, achievable learning outcomes, credit points value, duration, mandatory and elective courses, thesis requirements, contact classes, compliance with mandatory laws, degree awarded, opportunities for continuing studies, and evaluation procedures. The results of the analysis demonstrate that the master's study program fully complies with state regulations.

Additionally, FC conducted an analysis of the mapping of master study program study courses to the learning outcomes, which was documented in Annex V-8 Mapping of learning outcomes V3.xlsx of SER. The learning outcomes of the master study program were defined according to the guidelines approved by the European Quality Assurance Network for Informatics Education (EQANIE). The analysis confirmed that the learning outcomes of the master study program are compliant with the program's goals.

Furthermore, FC provided comprehensive plans for all specializations and education forms (full-time and part-time) of the master study program, documenting all necessary components of the master study program, including program and specialization-specific compulsory courses, elective courses, and the master paper. This analysis is documented in Annex V-9. Study plans V3.zip of SER and is accurate and compliant with the master study program declared objectives and specialization directions.
Moreover, FC provided detailed course descriptions for all 58 courses offered in the master study program, as documented in Annex V-10. Course Descriptions V2.docx of SER. These descriptions include the courses' objectives, prerequisites, learning outcomes, content, course plan, and tasks and assignments for individual work, demonstrating that the content of the study courses is interconnected and allows for the achievement of master study program objectives.

As described in SAR pp. 120, all specializations share a common trunk of compulsory courses that amount to 24 CP; the rest of the courses are restricted electives and depend on the specialization. The study courses are interconnected and complementary; the proposed curricula correspond to the learning outcomes of the program. All content is state-of-the-art in terms of scientific and industrial trends.

Some courses, such as Mate6029 Selected topics in mathematical statistics for computer science (masters), and Mate3028: Theory of Probability and Mathematical Statistics (bachelor) cover some similar topics. Comments from the lecturers were, that these topics in the master's program are discussed deeper, with more technical details.

Lastly, the master study program has added new industry-relevant study courses, such as Big Data

Technologies, Computer Security and Vulnerabilities, and Open Government Data in a Data-Driven World, reflecting current ICT sector development trends (SER, p. 120).

2.2.2. In order to assess the relevance of master students' achievements, the FC considers factors related to Erasmus mobility, as stated on page 128 of the SAR document, thus justifying the criteria “whether the awarding of degrees is based on the achievements and findings of the relevant field of science of artistic creation” by comparing master study program with the programs in the other universities (the SAR pp. 128 mentions explicitly the Polytechnic University of Madrid and undisclosed universities in France and Germany).

However, it should be noted that the participation of master study program students in Erasmus is relatively low. According to Annex II-28 of the SER, only 17 students have taken part in Erasmus in the past six years, which averages to only three students per year. Experts believe that Erasmus's argumentation could not be used for master study program relevance justification.

Nevertheless, it is worth noting that the scientific and practical relevance of master papers is evaluated by reviewers, all of whom hold doctoral degrees in their respective fields. In the previous accreditation period, there was no instance where a student's work had to be marked down due to an outdated topic, as reported on page 131 of the SER document.

2.2.3. Annex V-10 (Annex V-10. Course Descriptions V2.docx) of the SAR document provides a detailed approach to organizing students' independent work, assignments, requirements for earning credits, and criteria for evaluating learning outcomes for each study course and seminar. This systematic approach ensures an individualized and results-oriented study process, with clearly defined rules and guidelines.

To ensure a student-centered learning environment, a variety of methods are used, including lectures, independent and group assignments, laboratories, e-learning, participation in seminars, and discussions, as stated in Annex V-10 of the SAR document and confirmed in assessment visit interviews with master study program students and teachers.

Additionally, students are given the opportunity to choose one of six specializations (Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering) offered by the master study program (as described in Annex V-9 Annex V-9. Study plans V3.zip of the SER), which allows them to tailor their studies to their professional and career interests.

Regular surveys of students and graduates are conducted by FC to provide feedback and improve the study process. The results of these surveys are analyzed by the corresponding teachers, study program directors, and study field directors, as outlined in Annex II-24, Annex II-25, Annex II-26, and Annex II-27 of the SER document. This feedback helps to ensure that the master's study program maintains a student-centered approach and continuously improves its programs to meet the needs of its students.

2.2.4. N/A

2.2.5. N/A.

2.2.6. The SER document provides an analysis of Master's theses topics and their relevance to the master study program study field, as detailed on pages 130-131. Three categories of Master's theses were identified by FC:
1. Theoretical computer science (mainly mathematically oriented thesis with the development of new algorithms and theorem proving, for example in the field of quantum computing) (7%).
2. Experimental computer science (testing, analyzing, and comparing system software tools, software prototyping, and experimental evaluation, and other experiments) (61%).
3. Applied research (analysis of real business processes, software development, and operation processes in specific companies in order to improve them, development of systems and software components for real use in a specific company or to offer on the market, etc.) (32%).

The FC considers the predominance of experimental theses as a very healthy trend, as noted on page 131 of the SER. However, the FC also states that "the assessment of the relevance in the 'labor market' is not applicable to the final theses of students of the academic master's program."

The Experts disagree with this approach, as they believe that the labor market includes a wide range of enterprises that develop innovative ICT products and processes, as well as educational and academic institutions. Therefore, both professional and academic master's study programs should be relevant to the requirements of the labor market. The experts suggest that the relevance of Master's theses to the labor market requirements should be evaluated to ensure that the research conducted by students has practical applications and can contribute to the development of innovative ICT products and processes.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
A compliance analysis of the master study program to the Latvian state Regulations No 240 was carried out by FC and covers various indicators, including the program's goals, achievable learning outcomes, credit points value, duration, mandatory and elective courses, thesis requirements, contact classes, compliance with mandatory laws, degree awarded, opportunities for continuing studies, and evaluation procedures.

The learning outcomes of the master study program were defined according to the guidelines approved by the European Quality Assurance Network for Informatics Education (EQANIE). The analysis confirmed that the learning outcomes of the master study program are compliant with the program's goals.

The master study program offers a wide range of specializations, with six sub-programs to choose from: Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering. These specializations are available in both full-time and part-time study modes, allowing students to choose the option that best fits their needs and schedules. Plans for all specializations and education forms (full-time and part-time) are accurate and compliant with the master study program's declared objectives and specialization directions.

The descriptions of study courses include the courses' objectives, prerequisites, learning outcomes, content, course plan, and tasks and assignments for individual work, demonstrating that the content of the study courses is interconnected and allows for the achievement of the master study program

objectives.

FC has updated the master study program by adding new industry-relevant study courses thus reflecting current ICT sector development trends.

Strengths
1. The master study program offers a wide range of specializations, with six sub-programs to choose from: Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering.
3. All master study program specializations are available in both full-time and part-time study modes, allowing students to choose the option that best fits their needs and schedules.
4. Master study program has been updated by adding new industry-relevant study courses thus reflecting current ICT sector development trends.

Weaknesses:
1. The low number of students participating in the Erasmus exchange program.
2. There are no international students in the master's study program.
3. The assessment of the relevance of the final theses of students of the master study program to the labor market is not considered an important factor by FC

Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)

1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

Assessment of compliance: Fully compliant

The master study program offers a wide range of specializations, with six sub-programs to choose from: Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering. These specializations are available in both full-time and part-time study modes, allowing students to choose the option that best fits their needs and schedules. Plans for all specializations and education forms (full-time and part-time) are accurate and compliant with the master study program declared objectives and specialization directions, being based on the state of the art of the field of science.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The material, technical, information, and study provision are all used in all levels of this study field, therefore do not differ between included study programs. A more thorough analysis can be seen at 1.3. Section of this report.

Mainly the study process is conducted at Raiņa Bulvāris 19. At the main premises, there are available larger auditoriums (up to 130 places), 3 seminar rooms, 4 computer classes (20-25 places), a Linux center (20 places), and “DF LAB”, that serves as a more “creative space” for students to work on their practical works/thesis, etc. There are available 3D printers, Speedy 400 laser cutters, soldering stations, and others. Auditoriums, seminar rooms, and computer classrooms are fully equipped with projectors, portable computers, desktop computers, wireless Internet, sound system, and electricity connection points for student workplaces (partially) (SAR p.56-57).

In the same building, there is an available library that provides the methodological and informative provisions needed for the implementation of this study program. (SAR p.59) There are two e-studies environments available – estudijas.lu.lv and edu.lu.lv, that provide access to all the needed resources, grading, etc. (SAR p.60). The actual publication can be found online (http://dspace.lu.lv/dspace/), including scientific papers, dissertations, and others. Various databases are available for students, f.e., EBSCO host, ProQuest eBook Academic Complete, and SpringerLink Contemporary Journals. All available databases are available on-site at the libraries or online using provided login data (https://www.biblioteka.lu.lv/resursi/abonetie-e-resursi/).

Taking into account all the previously mentioned, the study, material, and technical provision is sufficient and provides the possibility to ensure a high-quality study process.
The finances are planned locally by the faculty and planned together rather than separated specifically by the study program (SAR p.55). The experts believe that this manner is sufficient since most materials are planned for all the programs and therefore the financial provision is sufficient.

2.3.2. N/A

2.3.3. The calculated state budget grant from the Ministry of Education and Science in the 2021/2022 academic year is 3668 EUR for full-time regular studies. The tuition fee for studies in the Latvian language is 3670 EUR/year, however, the students study only in budget places. The fee for studies in English is 4500 EUR/year for full-time and 3000 EUR/year for part-time, however, no English students are enrolled. The program so far has been implemented only in the form of full-time regular studies (SAR p.107).

The largest expenditure is planned for salaries: teaching staff (38.6%) and general (27.1%). Indirect costs come up to 26%, infrastructure 5.3%, and goods and services make up 3%. (SAR p.108) Summing up the revenues of the study program (state grant) – 443 828 EUR and the program expenses – 445 522 EUR for 121 state-budget funded students, the result of the studies, taking into account the cost calculation, has a minimal minus value, which does not affect the successful implementation of the study program (Annex V-7).

The sensitivity analysis graph of cost based on the number of students shows that with the study grant of 3668 EUR/year, the rentability is achieved at around 121 students. The minimum number of enrolled students is stated as 25. From the available statistics (V-5 Annex), the number of active students in the program is from 160 (in 2021/2022) to 190 (in 2016/2017), which shows that the program is rentable at the current cost. The enrolled students have decreased in recent years from 120 (in 2016/2017) to 90 (in 2021/2022).

The experts believe that the funds are sufficient and allow the development of the study program, however, there are threats visible in the future if the decreasing trends continue.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The study provision is sufficient for the implementation of the master's study program. Studies are held at the faculty building that offers auditoriums. The methodological and informative resources

are accessible to students via two main websites and are sufficient.

The master study program has been carried out only by enrolling students in budget-funded places. The finances are balanced, however, there are threats visible in the future if the decreasing trends of enrollment continue.

Strengths:
1. The library has sufficient methodological materials that are replenished regularly.
2. There are national and international projects available for research funding.
3. “DF LAB” project studio is available for students to work on their various types of practical research and laboratory work during or outside of their studies.

Weaknesses:
1. There is a decreasing number of enrollments.

Assessment of the requirement [6]

1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

Assessment of compliance: Fully compliant

The resources are sufficient for the implementation of the master study program. The finances are balanced, however, there are threats to the sustainability of the master study program in the future if the negative trends continue.

2.4. Teaching Staff

Analysis

2.4.1. In the implementation of the master study program 38 academic staff members are involved, including elected professors (13), associate professors (5), and assistant professors (8) of computer science, as well as 1 visiting professor of computer science (SAR, p.134).

In accordance with Article 55, Paragraph 1, Clause 3 of the Law on Higher Education Institutions, no less than five professors and associate professors elected at the relevant higher education institution participating in the implementation of the compulsory part and the limited optional part of the academic study programs. The compulsory part of the program is taught by more than five elected professors and associate professors.

The SAR (p.134) and attached Annexes II-11 “List of teachers involved in the implementation of programs of the study direction (lecturing in study courses) in 2021” and IV-10 “Certification by the Head of Direction” affirm that the qualification of the teaching staff generally complies with the requirements for the implementation of the master study program and the requirements set forth in the Law of Higher Education Institutions and is appropriate for study program implementation, allow to achieve the aims and ensure the learning outcomes of the study program in both Latvian and English languages. Except for the fact that one lecturer who taught in the sub-program Bio-informatics the English language knowledge level (knowledge level is A2) does not. But according to the information provided by faculty management this member works only with latvian students group. All members of the teaching staff involved in the implementation of master study programme for foreign students, has appropriate english knowledge level that meets the law requirement, e.g. is

B2 and higher. (Annexe II-11).

2.4.2. During the reporting period there was a change in the composition of the academic staff. Two senior professors (at the age of 76 and 80, respectively) ended their teaching activities whose study courses were overtaken by younger teaching staff in a timely manner. There were elected five new assistant professors. These changes do not negatively affect the quality of the implementation of the study program.

Four older generation professors are involved in study course teaching (71, 73, 73, and 76 years old respectively). The oldest of them involved younger colleagues in teaching his courses, thus preparing his replacement. The age of the other teaching staff of the program does not exceed 59 years (SAR, p.134).

2.4.3. N/A

2.4.4. According to appendix IV-10. Certification by the Head of Direction and CV of the academic staff of all the academic personnel involved in the implementation of the study program “Computer Science” (current code 45483) corresponds to the recommendations set in the Law on Higher Education Institutions paragraph 3 of the first part in Article 55. This fact was verified by reviewing the CVs of the teaching staff and confirmed by experts.

2.4.5. SAR states that the development process of the new study course includes separate activities at the program director or potential course author's initiative (SAR, p.135).

1. The course authors consult with the program director about the necessary prior knowledge for the course and potential points of overlap with other program courses.
2. If necessary, the new course includes a small revision of the background material, or students are instructed on where to find such material.
3. The program director performs the analysis of the course interlinking on which learning outcomes of other courses the new course can rely on.

According to the regulatory document “DEVELOPMENT AND UPDATE ORDER OF STUDY COURSES AT LATVIA UNIVERSITY” (approved by LU on 10.08.2018. order No. 1/277, Annex II-4) the study course must be updated at least once during the current accreditation period. During interviews with teaching staff, the experts did not gain confidence that the teaching staff actively renew the content of the study course. Several faculty members mentioned existing procedures for developing new courses. But only a few noted that they have renewed the curriculum of study courses based on the results of the mandatory survey of students and students' comments.

During the interviews in assessment visits with graduates, it was mentioned that there exists an overlap in the content of study courses related to the mathematics taught in the master study program and bachelor study program “Computer science” (code 43483). SAR states that in order to make the courses accessible to students from non-computer bachelor programs, it is often necessary to include repetitions of study materials or to reserve time for students’ independent work for acquiring the missing study content. The director of the master study program mentioned that

teaching staff continues to teach related or advanced study courses at the master's level. This indicates insufficient communication between study course developers in different levels of studies (bachelor and master) or inappropriate content of master study courses while the requirements of master level must be higher.

Several study courses are taught jointly by two or more lecturers, for example, “Mathematics for Computer Science I, II”, “Knowledge Engineering”, “System Design”, and “Big Data Technologies” (SAR, p.136). The teaching staff involved in study course implementation cooperate with each other and agree on the topics taught by each lecturer, the evaluation criteria of the course, the sequence of the content, and the presentation of topics.

A mechanism for mutual cooperation of the teaching staff in the implementation of the study program is established. Generally, it ensures the achievement of the aims of the study program and the interconnection of study courses within the study program.

Conclusions on this set of criteria, by indicating strengths and weaknesses

Conclusions
The implementation of the master study program is ensured by competent academic staff. The study process is successfully implemented in the UL. The UL purposefully takes measures and implements changes in the composition of the teaching staff. The overlap of the content of study courses taught in the master study program and bachelor study program “Computer science” (code 43483) exists. This indicates insufficient communication between study course developers in different levels of studies (bachelor and master) or inappropriate content of master study courses while the requirements of master level must be higher and results must comply with EQF level 7.

Strengths
1. The qualification of the teaching staff members involved in the implementation of the study program complies with the requirements for the implementation of the study program.
2. More experienced professors prepare younger colleagues to take over their courses of study.

Weaknesses
1. There exists an overlap between the content of study courses taught in the master study program and the bachelor study program “Computer science” (code 43483).

Assessment of the requirement [7]

1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

Assessment of compliance: Fully compliant

The qualification of the academic staff complies with the requirements specified in the Law of Higher Education Institutions, the Law of Scientific Activity, and UL regulatory documents, as well as with the conditions for the implementation of the master study program.

2.5. Assessment of the Compliance

Requirements

1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard

Assessment of compliance: Fully compliant

The attached document Compliance with education standard (Annex V-6. Compliance with education standard V2.docx) affirms that the study program complies with the State Academic Education Standard: Cabinet of Ministers of 13 May 2014 No. 240 “Regulations on the state standard of academic education” https://likumi.lv/doc.php?id=266187.

2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

Assessment of compliance: Not relevant

3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561 , Paragraph two and Section 562 , Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Fully compliant

The attached study course descriptions (Annex V-10. Course Descriptions V2.docx) are prepared in Latvian and English languages (in which the study program is implemented) and comply with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions

4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

Assessment of compliance: Fully compliant

The attached diploma sample confuses experts because its size is A4 instead of A5. For this reason, experts call the management to pay attention (check) to the requirements of the regulations, especially to the information mentioned in Clause 16. The size of the diploma, except for the cases mentioned in Clause 17 of these regulations, must be an A5 page (148 x 210 mm).

5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

Assessment of compliance: Fully compliant

The attached Certification by the Head of Direction (IV-10. Certification by the Head of Direction.edoc) affirms that the academic staff of the academic master study program complies with the requirements set forth in the Law on Higher Education Institutions.

6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Not relevant

7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

Assessment of compliance: Not relevant

8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

Assessment of compliance: Fully compliant

The attached Annex II-13. Certificate of the Head of the study direction regarding state language proficiency of teaching personnel.edoc. Certificate of the Head of the study field regarding state language proficiency of teaching personnel (signed on 09.10.2022) affirms that the knowledge of the official/national language of the academic staff involved in the implementation of the study program complies with the Regulations on the extent of knowledge of the national language and the procedure for testing the knowledge of the national language for performing professional and official duties.

9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

Assessment of compliance: Fully compliant

The attached Certificate of the Head of the study direction regarding English language proficiency of teaching personnel (Signed on 09.10.2022, Annex II-13a) and List of teachers involved in the implementation of programs of the study field (lecturing in study courses) in 2021 (Annex II-11) affirm that English knowledge level of the teaching staff involved in the implementation of the study program is B2 and higher.

10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

Assessment of compliance: Fully compliant

The attached Templates of Study agreements (II-3.annex. Templates of study agreements.zip) comply with the requirements set in the Minister Cabinet regulation No.70 “Studiju līgumā oblgāti ietveramie noteikumi”.

11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

Assessment of compliance: Fully compliant

The Agreements with Riga Technical University (RTU) on students take over in case of cancellation of master study programs (see II-33. annex. Agreements with RTU on students take over in case of cancellation of study programmes.zip.) affirms that students are provided with opportunities to continue their education in Riga Technical University academic master's study program "Computer systems" or academic master's study program "Information Technology" if the implementation of the study program is terminated.

12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme’s license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

Assessment of compliance: Fully compliant

The attached Annex II-32 (II-32. annex. Proof of compensation by the Rector.docx) “Proof of compensation by the Rector” (Riga, 28.12.2021. , No 1-13/831) affirms that students are guaranteed compensation for losses if the study program is not accredited or the study program’s license is revoked due to the actions of the higher education institution and the student does not wish to continue studies in another study program.

13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

Assessment of compliance: Not relevant

14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

Assessment of compliance: Not relevant

Assessment of the requirement [8]

1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

Assessment of compliance: Fully compliant

The master study program complies with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments, but FC management should pay careful attention to the diploma.

General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme

Conclusions
The master study program fits well the study field and its title is compliant with the study field. The master's study program can be delivered in Latvian and English, targeting international students. There exists an overlap of the content of separate study courses taught in the master study program and the bachelor study program “Computer science” (code 43483). However, the master's study program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The master study program is fully justified and aligned with the labor market requirements. FC has updated the master study program by adding new industry-relevant study courses thus reflecting current ICT sector development trends. The master study program offers a wide range of specializations, with six sub-programs to choose from: Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering. These specializations are available in both full-time and part-time study modes, which aligns with students' careers, possibilities, and professional interests. This approach promotes student-centered learning and teaching principles.

The study provision is sufficient for the implementation of the master's study program. The master study program has been carried out only by enrolling students in budget-funded places. The finances are balanced, however, there are threats visible in the future if the decreasing trends of enrollment continue.

The implementation of the master study program is ensured by competent academic staff. The study process is successfully implemented in the UL. The UL purposefully takes measures and implements changes in the composition of the teaching staff. The overlap of the content of study courses taught in the master study program and bachelor study program “Computer science” (code

43483) exists.

Strengths
1. The master's program offers 6 specializations, all well included in the field of studies.
2. The master program is well integrated with the industrial and research trends, as well as has been updated by adding new industry-relevant study courses thus reflecting current ICT sector development trends.
3. The changes in the composition of academic staff are performed in a timely manner. More experienced professors prepare less experienced colleagues to take over their courses of study.
4. The master study program offers a wide range of specializations, with six sub-programs to choose from: Bioinformatics, Computer Engineering, Computer Science, Information Systems, Information Technologies, and Software Engineering.
5. All master study program specializations are available in both full-time and part-time study modes, allowing students to choose the option that best fits their needs and schedules.
6. The qualification of the teaching staff members involved in the implementation of the study program is high and complies with the requirements for the implementation of the study program.

Weaknesses
1. The one-year version of the master program provides less content than the two-year version for the same final diploma/title.
2. The program exhibits a very high student dropout/ all-but-dissertation rate.
3. The low number of students participating in the Erasmus exchange program.
4. There are no international students in the master's study program.
5. The finances of the master's program are balanced, however, there are threats visible in the future if the decreasing trends of enrollment continue.
6. Some courses, such as Mate6029 Selected topics in mathematical statistics for computer science (masters), and Mate3028: Theory of Probability and Mathematical Statistics (bachelor) cover some similar topics. Comments from the lecturers were, that these topics in the master's program are discussed deeper, with more technical details.

Evaluation of the study programme "Computer Science"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Computer Science"

Short-term recommendations

1. Consider implementing a consistent plan for the reduction of the student drop-out rate.
2. One and two-year master's programs differ, but students receive the same degree. The difference should be emphasized, e.g. by using different titles.
3. Review and if necessary modify the content of the potentially overlapping courses (e.g., Mate6029 Selected topics in mathematical statistics for computer science (masters), and Mate3028: Theory of Probability and Mathematical Statistics (bachelor))

Long-term recommendations

1. Consider the implementation of a timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation, targeting the statistics of employers.
2. Consider the documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
3. Implement a systematic regular process of updating study courses including renewal of the curriculum of study courses at least once every two years.
4. Analyse the main reasons for dropout and prepare plans to minimize it.

II - "Computer Science and Mathematics" ASSESSMENT

II - "Computer Science and Mathematics" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" (study field) include the Doctoral Study Programme “Computer Science and Mathematics” (doctoral study program) consists of two subprogrammes "Computer science and electronics" and "Mathematics" which correspond to different fields of science.
1. The subprogramme "Computer science and electronics" corresponds to the fields of science "Computer science and informatics" (natural sciences) and "Electrical engineering, electronics, information, and communication technologies" (engineering sciences).
2. The subprogramme "Mathematics" corresponds to the field of science "Mathematics" (natural sciences).

The two subprogrammes were joined (and accredited) in 2021.

The SAR pp. 175 also mentions, "Students of the program can develop a Ph.D. thesis in one of the three branches of science: computer science and informatics, electrical engineering, electronics, information and communication technologies, or mathematics.” The first two mentioned branches of science fit perfectly within the study field, while “Mathematics” is not necessarily a perfect fit (mathematics is minor in this area of studies that covers three branches of science; although mathematics is fundamental to all science branches, pure mathematics - as the general name suggests - are less related; the content of the mathematics study program, as shown in the thesis results, is more like applied mathematics). Also, the mathematical topics approached within the doctoral study program are mainly statistics, applied differential equations, and modeling of neural networks, which, all, seem more appropriate to be covered by the name “Applied Mathematics”.

Overall, the doctoral study program, in its majority, fits within the study field.

2.1.2. The SAR pp. 175 mentions that “Students of the program can develop a Ph.D. thesis in one of the three branches of science: computer science and informatics, electrical engineering, electronics, information and communication technologies, or mathematics.

The study program has three codes corresponding to these three branches of science: 51483

("Computer systems, databases, and computer networks"), 51523 ("Electronics and automation"), and 51460 ("Mathematics").

After defending a Ph.D. thesis in computer science and informatics or in mathematics, a degree of doctor of science (Ph.D.) in natural sciences is awarded. After defending a Ph.D. thesis in electrical engineering, electronics, information, and communication technologies, a degree of doctor of science (Ph.D.) in engineering and technology is awarded."

The duration of studies is 4 (full) years, for 192 credit points (CP). The doctoral study program can be provided in both Latvian and English. The duration, scope, and language of the doctoral study program are reasonable and justified.

SAR pp. 176 describes the admission requirements "DSP "Computer Science and Mathematics" has the following specified admission requirements: master's degree in computer science, master's degree in mathematics, master's degree in engineering in computer science or information technology, or a diploma of at least five years of higher education corresponding to the above-mentioned master's degrees; master's degree in another field or a diploma corresponding to a master's degree with work experience in the field of information technology or mathematics (at least 3 years); successfully passed entrance exams. "

The goal of the doctoral study program, as described in SAR pp. 169 is "to provide opportunities for the growth of scientific workers and teaching staff in the fields of computer science and mathematics, promoting the preparation of such professionals for fundamental and applied research, work in the national economy or public administration, whose knowledge, skills and competence meet the Latvian and international requirements of highest level specialists in the fields of computer science and mathematics. The main components of the quality of research-based education are the management of modern research methodologies in the industry, skills necessary to perform research work, a world view based on science, competencies in research management and pedagogical work." This describes very well also the aims and learning outcomes of the doctoral study program.

Graduates of the doctoral study program work mainly in education, research, and deep-tech industries. The title of the doctoral study program precisely characterizes the study field, the goal, and the outcomes of the program. The parameters of the study program are interrelated.

2.1.3. The previous evaluation of the doctoral study program was performed in 2017 for the then-existing doctoral study program "Computer Science". Since then, the doctoral study program received several corrections/ modifications.

[SAR, pp. 174] Merging of the DSP "Computer Science" and "Mathematics" into the current DSP "Computer Science and Mathematics", licenses in 2021. Changes in the diplomas and awarded titles were subsequently made, also to comply with the 2022 law on research activities.

[SAR, pp. 174] The range of study courses in the limited elective part was expanded to include the courses: DatZ7070 Data Mining Algorithms (4 CP), DatZ7101 Open Government Data in a data-driven world (2 CP), DatZ7031 Virtual Environments (2 CP), DatZ7032 Wireless Sensor Networks (4 CP), DatZ7034 Digital design (4 CP)

[SAR, pp. 174] incorporating a free elective part in the amount of 2 credit points, correspondingly

reducing the limited elective part by 2 CP.

Mostly all these corrections are justified and supported; the merger of the DSP's "Computer Science" and "Mathematics" seems at least poorly explained (SAR pp. 46 mentions that "The merging of the programs took place when the University complied with the Ministry of Education and Culture's decision to reduce the number of study programs implemented in Latvia by a third.", SAR pp. 174 mentions only "as part of the consolidation of study programs" and SAR pp. 176 mentions "a unified, interdisciplinary approach to the preparation of new specialists, the acquisition of generally applicable competencies, the promotion of cooperation between individual fields of science, as well as the efficient use of funds"), the justifications being mainly related to requirements by the law and funding.

As pointed out in discussions during the visit to Riga (February 8-9, 2023) there is little to no integration between the computer science and mathematics study directions.

2.1.4. As described in the SAR pp. 176, and fully acknowledged in the evaluation at an international scale, "the information and communication technology (ICT) sector is experiencing rapid growth both in the world and in Latvia". As such, the need and justification for a study program that trains IT specialists are obvious. Especially [SAR pp. 177] "the need for highly qualified specialists who know computer science and mathematics as branches of science and are able to navigate research results is growing. Such skills are particularly important for ICT managers and the demand for ICT managers is expected to be one of the fastest growing". This justifies the existence of a DSP such as "Computer Science and Mathematics".

Since the current doctoral study program was licensed in 2021, one analyses the dynamics of students and graduates for the two subprograms, "Computer science and electronics" and "Mathematics", that were active in the reporting period.

The SAR shows (pp. 178) "During the last 6 years, the average number of doctoral students enrolled in the "Computer Science" study program is 7.33 doctoral students per year (the largest number: 10 per year, the smallest: 6), the average number of graduates – 5.14 graduates per year (the largest: 7 per year, the smallest: 3). The number of dissertations defended is 16 doctoral dissertations within 6 years – 2.67 PhDs per year. Thus, 37% of those who enroll in the doctoral program obtain a Ph.D. The average number of doctoral students enrolled in the study program "Mathematics" in the last 6 years is 4.2 (the largest: 5 per year, the smallest: 3), and the average number of graduates is 2 graduates per year (the largest: 3 per year, the smallest: 1). The number of dissertations defended is 6 doctoral dissertations within 6 years (on average 1 graduate per year). Thus, on average only a fourth of those who enroll in the doctoral program obtain a Ph.D. ".

These numbers represent a high dropout of students, both during their studies and in failure to prepare/defend the thesis. The main reason identified in the SAR is the "Main reason for student dropout in both study programs is the lack of funding for doctoral studies". In the assessment visit, the management of the doctoral study program said that they are aware of the dropout situation and are considering some corrective actions (accessing international funding and recruiting international students).

2.1.5. N/A

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The doctoral study program is interdisciplinary and fits well the study field. The doctoral study program can be delivered in Latvian and English, targeting international students. The doctoral study program title is compliant with the study field. The doctoral study program provides a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the doctoral study program are justified and reasonable. The doctoral study program is fully justified and aligned with the requirements of the labor market. Unfortunately, the cooperation between the subprograms is weak and there is a low thesis yield.

Strengths
1. The doctoral study program is interdisciplinary, covering computer science, electronics, and mathematics.
2. The doctoral study program leads to the implementation of long-term development of society and industry.

Weaknesses
1. The doctoral study program consists of two joint subfields (computer science, and mathematics) with little to no cooperation/ interaction.
2. The mathematical topics approached within the doctoral study program are mainly statistics, applied differential equations, and modeling of neural networks, which, all, seem more appropriate to be covered by the name “Applied Mathematics”.
3. The doctoral study program exhibits a very high student dropout at the all-but-thesis stage.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The doctoral study program offered by FC provides two subprograms - Computer Science and Mathematics - with additional specializations available for students who choose the Computer Science subprogram. These specializations are “Computer Science and Informatics” and “Electrical engineering, electronics, information, and communication technologies” (p. 179, SER).

Both subprograms have a common structure, with specialization achieved through elective courses and thesis topics. The doctoral study program is available as full-time studies, and seminars and research methods courses are conducted separately for each subprogram to serve the different needs and interests of the students (p.180, SER).
The content of the doctoral study program and its study courses were developed recently (2020-2021), taking into consideration the development trends of the scientific fields and the labor market, and therefore is up-to-date with ICT industry requirements and development trends (SER, p. 181).

To ensure the achievement of the learning outcomes of the doctoral study program, the study courses are mapped to the learning outcomes provided in VI-8 Annex Study course mapping_Labots_v2.docx of SER. The doctoral study program courses' descriptions, including objectives, prerequisites, learning outcomes, credit requirements, evaluation criteria, and topics covered, are provided in Annex VI-10. In contrast, the study plan is provided in VI-10 Annex Descriptions of study courses of the study programme.docx, demonstrating that the content and study plan of the doctoral study program aligns with the learning outcomes.

As shown in SAR pp. 180, all specializations have 178 CP of common, compulsory courses, 12 CP of restricted elective courses (specialization-dependant), and 2 CP of freely elective. Namely, “The credit point value of the compulsory part of DSP “Computer Science and Mathematics” is 178 CP. It consists of the development of a doctoral dissertation (134 CP), two doctoral exams (16 CP) – an exam in the specialty (12 CP) and an exam in English (4 CP), participation in a specialization seminar (14 CP), which is equivalent to participation in a doctoral school, general skills module (14 CP) – assisting in study courses (4 CP), supervision of student research (4 CP), study courses on research methods (4 CP) and publishing research papers (2 CP). Specialization seminars and the study course on research methods are conducted separately for subprogrammes "Computer science and electronics" and "Mathematics". Thus, the content is adjusted to the different needs and interests of the students in different subprogrammes. The value of the limited elective part of DSP “Computer Science and Mathematics” is 12 CP, it consists of the theoretical courses corresponding to each sub-programme (the list of courses is provided in the study plan in Appendix VI-9, course descriptions are attached in Appendix VI-10). For students specializing in the engineering field “Electrical engineering, electronics, information, and communication technologies”, courses such as "Digital signal processing" (4 CP) and "Wireless sensor networks" (4 CP) are offered. For students specializing in the natural science field "Computer science and informatics", courses such as "Computational complexity" (2 CP) and "Mathematical foundations of cryptography" (2 CP) are offered. Courses that are important to both specializations are offered to students of both specializations. The elective offering for the subprogramme "Mathematics" is largely different from the subprogramme "Computer science and informatics" but courses of general nature (for example, the cognitive science course) are offered to both subprogrammes together.”

The content of the study program is topical for each of its sub-programs (Computer Science, Mathematics), but there is little cooperation and interconnection between the sub-programs (as mentioned earlier in 2.1.1 and 2.1.3).

The compliance analysis with the Latvian Law for Higher Education Institutions requirements and the Latvian Cabinet of Ministers regulation Nr. 1001 "The order and criteria for awarding the degree of Scientific Doctor (promotion)" are provided in the "Compliance to requirements for the doctoral program" document, covering the academic personnel's capacity, study program duration, accreditation, and quality of the doctoral thesis.

2.2.2. This doctoral study program brings together the strengths of two previously existing UL doctor study programs: Computer Science and Mathematics. Recently completed, this merger has increased the capacity of the academic staff involved in this doctoral study program, as well as the labs, infrastructure, and range of potential cooperation partners (SER, pp 181-182).

As mentioned in SAR pp. 174, “ DSP "Computer science of mathematics" will award one of two degrees: A doctoral degree of Science - Doctor of Science (Ph.D.) in Natural Sciences - to students who specialize in mathematics or computer science and informatics. Doctoral degree of Science - Doctor of Science (Ph.D.) in Engineering and Technology - to students who specialize in electrical engineering, information, and communication technologies.”

The main directions of doctoral study program research areas include quantum computing, language technologies and machine learning, computer engineering and cyber-physical systems, and cognitive science (pp 186-187 of SER). Doctoral students in the doctoral study program have the opportunity to participate in Horizon 2020 projects, especially in the fields of quantum computing and language technologies (p. 182 of SER).

Research in computer engineering and cyber-physical systems is conducted at the Institute of Electronics and Computer Science. Doctoral students in this field have the chance to explore topics such as signal processing, embedded systems, robotics, autonomous cars, and smart sensors in the scope of EU research projects (p. 182 of SER, inputs from interviews in assessment visits with doctoral students).

Cognitive science, a new interdisciplinary field of research, was added to the doctoral study program as a result of a merge of Mathematics and Computer Science doctor study programs (p. 182 of SER).

In the "Mathematics" subprogram, research is concentrated on classical areas of research like mathematical modeling, differential equations, category theory, and mathematical statistics (p. 182 of SER, inputs from interviews in assessment visits with doctoral students).

Both awarded degrees are based on achievements and findings in their relevant field of science.

2.2.3. The doctoral study program employs a range of study forms and methods to help students achieve the program's objectives (pp. 183-184 of SER). These include lectures with input from ICT practitioners to promote the integration of theory and practice, scientific seminars with doctoral students as content creators (as evidenced by very positive feedback from interviews with doctoral students), and independent studies and research leading to scientific publications and conference papers.
Each study course is accompanied by an e-learning platform (Moodle), where students can access lesson materials, task descriptions, additional study materials, and study tasks such as tests, forums, seminars, and conferences (interviews with students and teachers).

The small number of students in the doctoral study program, combined with a wide range of specializations and elective courses available both in auditorium and e-learning formats, allows for student-centered learning and teaching principles to be applied.

The most important outcome of the doctoral study program is the preparation, submission, and defense of the doctoral dissertation to the doctoral council. However, according to statistics provided by FC in Annex VI-5 of SER, only five of the twenty doctoral students who enrolled in the doctoral study program in the last six years have graduated with a Doctoral degree. Additionally, the number of international students enrolled in the doctoral study program is low (only two students in the last six years, as noted in Annex VI-5 of SER).

FC conducts regular surveys of students and graduates to improve the study process. The results of these surveys are analyzed by the relevant professors, study program directors, and study field directors, as outlined in Annex II-24, Annex II-25, Annex II-26, and Annex II-27 of the SER document. This feedback helps to ensure that the doctoral study program maintains a student-centered approach and continuously improves its programs to meet the needs of its students.

We can conclude that the study implementation methods contribute to the achievement of the aims, goals, and learning outcomes of the study program.

2.2.4. N/A

2.2.5. Doctoral students in the doctoral study program receive guidance from scientific supervisors

who are experts in their respective fields, either provided by FC or its academic partners. Students are also encouraged to publish their research results and participate in scientific conferences, providing valuable opportunities for networking and validating their scientific results (SER, pp. 185-186, interviews with DSP students and teachers).

To develop general research skills among doctoral students, the doctoral study program offers mandatory courses that cover various topics, including research planning, literature review, data analysis, and research methods. For instance, DatZ7008, Methods of Research in Computer Science (4CP), Mate7032, Research Methods in Mathematics (4CP), and DatZ7098, Preparing Research Publications (2CP), are among the courses available to DSP students (Annex VI-10 of SER). According to feedback from doctoral study program students, these courses are instrumental in helping them write a successful doctoral thesis (from assessment visit meetings with students).
FC together with UL Institute of Mathematics and Computer Science, University of Agriculture of Latvia, University of Liepāja, and Vidzeme University of Applied Sciences is a co-publisher of an open-access electronic journal Baltic Journal of Modern Computing https://www.bjmc.lu.lv/en/ , which is indexed in Web of Science and SCOPUS. It is a very important factor for Doctoral program students when they publish their research results.

Students of the doctoral study program are provided with the opportunity to defend their doctoral dissertation with one of two doctoral councils (SER, pp 185-186):
1. UL Computer Science and Informatics Promotion Council,
2. UL Mathematics Promotion Council.

The councils are also involved in a supervision process and provide regular recommendations to the doctoral students and their supervisors to ensure that they are on track to achieve their research objectives.

The powers of the Faculty of Mathematics Sciences Promotion Council have been approved until 2025. The council promotes and awards scientific doctoral degrees: Doctor of Science (Ph.D.) in Natural Sciences (SER, p.185).

The powers of the Computer Science and Informatics Promotion Council have been approved until 2024. The council promotes and awards scientific doctoral degrees in two groups of branches of Science ((SER, p.186)) - Doctor of Science (Ph.D.) in Natural Sciences and Doctor of Science (Ph.D.) in Engineering and Technology.

It is recommended that both Councils should be merged in the future, adjusting to the potential of interdisciplinary research fields (Computer science and Mathematics).
Despite the clear promotion opportunities available to students, only 20% of students who matriculate in the DSP successfully achieve their Ph.D. degrees (Annex VI-5 of SER).

2.2.6. The research topics of doctoral students in the doctoral study programs align with the subprograms and specializations offered by the program. These research topics are diverse and cover a wide range of fields in computer science and mathematics. According to the SER (pp. 186-187), some of the most common thematic fields of a doctoral thesis include quantum computing and mathematical computer science, language technologies, software and data quality and testing, image processing, IT security, high-performance computing, e-learning technologies, differential equations, discrete mathematics, and mathematical informatics, mathematical analysis and functional analysis, mathematical modeling, probability theory, and mathematical statistics.

These research topics are relevant to the current state of research in computer science and mathematics and provide doctoral students with the opportunity to contribute to the advancement of these fields. Through their research, doctoral students develop advanced knowledge and skills that prepare them for careers in academia, research, industry, and other fields. The diversity of research topics also enables students to choose a field of study that aligns with their interests and career goals.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
Both doctoral subprograms (Computer Science and Mathematics) have a common structure, with specialization achieved through elective courses and thesis topics. The doctoral study program is available as full-time studies, and seminars and research methods courses are conducted separately for each subprogram to serve the different needs and interests of the students.

The content of the doctoral study program and its study courses were developed recently (2020-2021), taking into consideration the development trends of the scientific fields and the labor market, and therefore is up-to-date with ICT industry requirements and development trends.

Doctoral students in the doctoral study program have the opportunity to participate in Horizon 2020 and other EU research projects.

The small number of students in the doctoral study program, combined with a wide range of specializations and elective courses available both in auditorium and e-learning formats, allows for student-centered learning and teaching principles to be applied.

A small number of students have graduated from doctoral study programs with a Doctoral degree in the last 6 years (25% of those who started the study in the doctor study programs).

A small number of international students enrolled in the program (only two students in the last six years). Experts agree that there are 2+2 international students, yet the number of 4 students over 6 years is still small.

Two separate doctoral councils (Computer Science and Mathematics) continue to serve students of one doctoral study program with unclear strategies on how to serve interdisciplinary doctoral research topics.

The research topics of doctoral students are relevant to the current state of research in computer science and mathematics and provide doctoral students with the opportunity to contribute to the advancement of these fields. Through their research, doctoral students develop advanced knowledge and skills that prepare them for careers in academia, research, industry, and other fields. The diversity of research topics also enables students to choose a field of study that aligns with their interests and career goals.

Strengths
1. The content of the study program and its study courses were developed recently (2020-2021), taking into consideration the development trends of the scientific fields and the labor market.
2. Doctoral students in the program have the opportunity to participate in Horizon 2020 and other EU research projects.
3. The small number of students in the doctoral study program, combined with a wide range of

specializations and elective courses available both in the auditorium and e-learning formats, allows for student-centered learning and teaching principles to be applied.
4. Possibility to publish students' research results in the Baltic Journal of Modern Computing, which is indexed in Web of Science and SCOPUS.

Weaknesses
1. A small number of students have graduated from the doctoral study program with a Doctoral degree in the last 6 years (25% of those who started studies in the doctoral study programs).
2. A small number of international students enrolled in the doctoral study program (only two students in the last six years).
3. Two separate doctoral councils (Computer Science and Mathematics) continue to serve students of one doctoral study program with unclear strategies on how to serve interdisciplinary doctoral research topics.

Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)

1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

Assessment of compliance: Fully compliant

These research topics of doctoral students are relevant to the current state of research in computer science and mathematics and provide doctoral students with the opportunity to contribute to the advancement of these fields. Through their research, doctoral students develop advanced knowledge and skills that prepare them for careers in academia, research, industry, and other fields. The diversity of research topics also enables students to choose a field of study that aligns with their interests and career goals.

A proactive internationalization strategy should be developed in order to increase the number of FC doctoral students.

The need for the two separate doctoral councils (Computer Science and Mathematics) should be analyzed, and cooperation within the program extended not just formally by keeping it under one title/program, but by implementing it.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The material, technical, information, and study provision are all used in all levels of this study field, therefore the basis does not differ between included study programs. A more thorough analysis can be seen at 1.3. Section of this report.

This doctoral study program is implemented by two UL faculties: the Faculty of Computing and the Faculty of Physics, Mathematics, and Optometry In addition, 3 teaching staff members from other faculties are involved. The structural units of the Mathematics Department have been involved in the implementation: Department of Differential Equations and Approximate Methods; Mathematical Analysis; General Mathematics and Laboratory of Statistical Research and Data Analysis. In the Faculty of Computing, 4 departments and 4 scientific laboratories are involved in the implementation: Department of Computer Science; Programming; Mathematical Foundations of Computer Science; Lifelong Education Informatics; Quantum Computer Science Centre; Laboratory

of Perceptual and Cognitive Systems; Laboratory of Computational Linguistics and Laboratory of Innovative Information Technologies (SAR p.189).

Mainly the study process is conducted at Raiņa Bulvāris 19 and the Academic Center at Jelgava 3. At both locations, there are available auditoriums, classes, etc. There are available 3D printers, Speedy 400 laser cutters, soldering stations, and others. Auditoriums, seminar rooms, and computer classrooms are fully equipped with projectors, portable computers, desktop computers, wireless Internet, sound system, and electricity connection points for student workplaces (partially) (SAR p.56-57). The doctoral students' scientific work significant number of students takes place at the Institute of Mathematics and Computer Science (LU MII Raiņa Boulevard 29) and the Institute of Electronics and Computer Sciences (EDI, Dzērbenes Street 14). Doctoral students working in these institutes are able to use the infrastructure of these institutes, such as high-performance computing (HPC) resources of LU MII and tests for the Internet of Things and wireless sensor networks EDI (SAR p.189).

At both buildings, there are available libraries that provide the methodological and informative provisions needed for the implementation of this study program (SAR p.59). There are two e-studies environments available – estudijas.lu.lv and edu.lu.lv, that provide access to all the needed resources, grading, etc. (SAR p.60). Taking into account all the previously mentioned, the study, material, and technical provision is sufficient and provides the possibility to ensure a high-quality study process.

The finances are planned locally by the faculty and planned together rather than separated specifically by the study program (SAR p.55). There is an annual doctoral study program development project (with funding between 30 and 40 thousand EUR), which can be used to support small investments in the infrastructure, doctoral students' trips to scientific conferences and summer schools to present research results and gain experience, guest lecturers, etc. for the development of the activity program (SAR p.189) The experts believe that this manner is sufficient since most materials are planned for all the programs and therefore the financial provision is sufficient.

During the meeting during the assessment visit with the graduates of the doctoral study program, the topic of helping fund studies for international students was brought up. The graduates believe that there should be more mechanisms to help international students cover the fees since government-funded places are only available for Latvian citizens. It was also brought up that there were no options for international students to apply for job opportunities locally at the university to aid them with paying their tuition fees or regular expenditures. However, meetings with doctoral study programmes managment, was pointed out that international students from EU countries can be enrolled (and have been enrolled) in study slot funded by state budget. In this case, no study fees are required. For international students outside the EU, the FC can suggest waiving the study fee. This has been used by the Faculty of Computing for international students and we plan to continue this in future.

2.3.2. The scientific base consists of the mentioned two faculties, the Institute of Mathematics and Computer Science and the Institute of Electronics and Computer Science. Together, these institutions offer research opportunities in a wide range of topics.

The FC is known for its research in quantum computing, cognitive sciences, data processing systems, and software project management. There is strong cooperation with the programming

industry, f.e., with SIA “Tilde”. The Department of Mathematics of the Faculty of Physics, Mathematics, and Optometry is known for research in mathematical analysis, statistics, and other branches of mathematics. The Institute of Electronics and Computer Science conducts research in computer engineering, embedded systems, sensor networks, and other areas related to information technology, computing, electronics, telecommunications, and computer control. Many of the institute’s leading researchers are also faculty teaching staff members (SAR p.190). During the meeting with doctoral students, it was discussed that almost all students are employed in some research projects, as well some do teach at the faculty.

Doctoral students also have access to European research infrastructures in which UL participates, for example, CLARIN (Common Language Resources and Technology Infrastructure) in the field of computational linguistics. These resources are useful for the development of doctoral theses in language technologies and topics where high-performance computing is useful (SAR p.189).

2.3.3. The calculated state budget grant from the Ministry of Education and Science in the 2021/2022 academic year is 7,335 EUR for full-time regular studies. The tuition fee for studies in Latvian or English language is 7,340 EUR/year. The program is implemented only in the form of full-time regular studies (SAR p.107).

The largest expenditure is planned for salaries: teaching staff (38.6%) and general (27.1%). Indirect costs come up to 26%, infrastructure 5.3%, and goods and services make up to 3%. (SAR p.108) Summing up the revenues of the study program (state grant) is 7132 EUR per student per year, and the total cost of the program is 313,808 EUR per year. (SAR p.191)

The sensitivity analysis graph of cost based on the number of students shows that with the study grant of 7,335 EUR/year, the rentability is achieved at around 44 students. From the available statistics (VI-5 Annex), the number of active students in the sub-program “Computer Science” are from 31 (in 2021/2022) to 38 (in 2019/2020) and in “Mathematics” from 9 (in 2021/2022) to 18 (in 2017/2018), which shows that the sum of the students is sufficient to implement the study program.
The experts believe that the funds are sufficient and allow the development of the doctoral study program.

Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The study provision is sufficient for the implementation of the doctoral study program. Studies are held at the two involved faculties and other departments and institutes. The methodological and informative resources are accessible to students via two main websites and are sufficient. Almost all students are employed in research projects on the topic of their thesis.

The finances are balanced, it has a positive outcome.

Strengths:
1. There are national and international projects available for research funding.
2. “DF LAB” project studio is available for students to work on their various types of practical research and laboratory work during or outside of their studies.
3. Most doctoral students are employed in research projects on the topic of their thesis.
4. The program's finances have a positive outcome.

Weaknesses:
none

Assessment of the requirement [6]

1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

Assessment of compliance: Fully compliant

The resources are sufficient for the implementation of the doctoral study program. The finances are balanced.

2.4. Teaching Staff

Analysis

2.4.1. SAR states that 26 academic staff members are involved in the implementation of the doctoral study program “Computer Science and Mathematics” and all of them have a doctoral degree. 23 of 26 academic staff work in the branches of science corresponding to the current study program “Computer Science and Mathematics” (16 are professors, 4 associate professors, 2 leading researchers, and 1 acting professor), 3 work in other fields of science (English, research ethics). (SAR, p.193).

In accordance with Article 55, Paragraph 1, Clause 3 of the Law on Higher Education Institutions, at least five persons with a doctorate degree participate in the implementation of the academic doctoral study program, of which at least three are experts in the relevant field approved by the Latvian Science Council.

The attached Certificate of Head of Study Direction (Annex VI-7) affirms that the academic staff involved in the implementation of the current doctoral study program conforms to the requirements set forth in Article 55, Paragraph 1, Clause 3. The experts checked the LZP expert status of the mentioned academic staff and found that the sub-program “Computer science and informatics” involved 9 academic staff members with doctoral degrees who are experts in the relevant field approved by the Latvian Science Council, in the sub-program “Mathematics” are involved 5 academic staff members with a doctoral degree who are experts in the relevant field approved by the Latvian Science Council, in the sub-program “Electrotechnique, electronics, information, and communication technologies” are involved 6 academic staff members with a doctoral degree who are experts in the relevant field approved by the Latvian Science Council.

Experts would like to draw the attention of the faculty management that the rights of four (from 9) experts expire in 2023 in the field “Computer science and informatics”, and the rights of three (from 5) experts expire in 2023 in the field “Mathematics”.

The attached “Certificate of the Head of the study direction regarding state language proficiency of teaching personnel” (signed on 09.10.2022, Annex II-13) affirms that the knowledge of the official/national language of the academic staff involved in the implementation of the study program complies with the Regulations on the extent of knowledge of the national language and the procedure for testing the knowledge of the national language for performing professional and official duties.

The attached “Certificate of the Head of the study direction regarding English language proficiency of teaching personnel” (Signed on 09.10.2022, Annex II-13a) and “List of teachers involved in the implementation of programs of the study direction (lecturing in study courses) in 2021” (Annex II-11) affirm that English knowledge level of the teaching staff involved in the implementation of the study program is B2 and higher.

Attached list of publications (annexes II-14, II-17) and table VI-3. “Number of publications of the teaching staff” (SAR, p.194-195) approves that each member of the academic staff in the period from 2015 to 2021 has been published in peer-reviewed editions, including international editions. The academic staff involved in the implementation of the study program participate in the implementation of scientific projects both at the international and national level (Annex II-16. “Participation of teachers in projects marked by importance”). The attached CV of the teaching staff members (annex II-12) confirms the presentation of papers by the academic staff involved in the implementation of the program at international conferences and congresses.

Experts made sure that the academic staff involved in the implementation of the doctoral program ensures the acquisition of high-quality theoretical knowledge and research skills in the fields of computer science and mathematics, and enables the achievement of the aims and learning outcomes of the study program and the relevant study courses.

The qualification of academic staff involved in the implementation of the current program complies with the requirements for the implementation of the study program and the requirements set forth in the regulatory enactments.

2.4.2. According to the SAR (p. 193-194) the changes in the composition of the teaching staff involved in the study program sub-programs “Computer Science” and “Mathematics” (compared with the previously implemented) are mainly related to changes in the structure and content of the study program, including new study courses development, and the change of generations of teaching staff. Two professors in the sub-program “Mathematics” and Two professors in the “Computer science” will no longer continue their work. However, new courses of the study program will be taught by other members of the academic staff, i.e. two other associated professors in the “Computer Science” sub-program, and by the associate professor and lead researcher in the “Mathematics” sub-program. All of them carry out scientific activities, published publications indexed in SCOPUS and Web of Science databases, and participated in scientific projects in the sub-directions of quantum computing, multilingual knowledge, fuzzy mathematical morphology, and risk assessment technologies based on non-strict logic.

The management of the faculty developed a strategy for attracting new teaching staff, including staff from abroad (SAR, p.194).

It can be concluded that changes in the structure of academic staff involved in the study program do not negatively influence the level of study quality, as the qualifications and experience of the academic staff involved in academic work are suitable for achieving the overall learning outcomes of the study courses and the program.

According to the SAR, the powers of the Computer Science and Informatics Promotion Council have been approved until 2024. The council promotes and awards scientific doctoral degrees in two groups of branches of science: Doctor of Science (Ph.D.) in Natural Sciences, and Doctor of Science (Ph.D.) in Engineering and Technology. According to the Minister Cabinet Regulation Nr.1001 the

council must include at least five scientists who have the right of an expert of the Latvian Science Council in the field of science, two of them in the sub-field of science in which the doctoral thesis is defended. At the current moment, this requirement is fulfilled. Council includes 8 experts of the Latvian Science Council in the field of science and 3 experts in the sub-field of Electronics, electrical engineering, and information and communication technology. The rights of 3 experts in the sub-field of Electronics, electrical engineering, and information and communication technology exceed until the end of 2023. For this reason, the Council will not fulfill the requirements of Minister Cabinet Regulation Nr. 1001 after 02.12.2023 and will not be able to award a scientific doctoral degree Doctor of Science (Ph.D.) in Engineering and Technology.

2.4.3. All members of academic staff involved in the implementation of the study program participated in the implementation of research-related projects both at the international and national levels as project managers/coordinators, scientific /program leaders, lead researchers/performers/experts, researchers /experts that ensure the inclusion of new findings, knowledge and gained research experience in study courses to improve their content, and contributes to the implementation of a high-quality doctoral study program (Annex II-16. “Participation of teachers in projects marked by importance”, CV in annex II-12).

The academic staff has participated in projects of EU Framework Programmes (7th Framework Programme and Horizon 2020), projects financed by other EU and foreign programs, projects financed by EU Structural Funds, projects of the Latvian Council of Science, state research programs, a project commissioned by companies and state institutions and UL projects (SAR, p.196).

2.4.4. Attached list of publications (annexes II-14, II-17), CV (annex II-12), and the table VI-3. “Number of publications of the teaching staff” (SAR, p.194-195) approves that each member of the academic staff involved in the implementation of the doctoral study program has published in peer-reviewed editions during the period from 2015 to 2021, including international editions. Each member of the academic staff has published publications indexed in the SCOPUS and Web of Science databases.

The attached CV of the teaching staff members (annex II-12) confirms the presentation of papers by the academic staff involved in the implementation of the program at international conferences and congresses.

2.4.5. The academic staff involved in the implementation of the doctoral study program mainly cooperate in the form of jointly implemented projects (especially in the fields of quantum computing, cognitive science, and language technology), regular seminars (for example, a System Modelling seminar, a Machine Learning seminar, Cognitive Sciences seminars, Discrete Mathematics and Algebra, Multivalued Mathematical Structures and Their Applications, Discrete and Continuous Dynamical Systems, Statistical Research and Data Analysis Laboratory Seminar), organized conferences. Many members of the academic staff conduct research work at the Institute of Mathematics and Computer Science of the University of Latvia (SAR, p.197).

Many studies are conducted in cooperation with Latvian IT companies, for example, the research project “Multilingual human-computer communication modeling using artificial intelligence methods” was carried out in cooperation with SIA “Tilde”, the project “Scalable Understanding of Multilingual Media” was carried out in cooperation with LETA and several foreign research

institutions (SAR, p.197).

SAR states (p.197) that during the reporting period, members of academic staff participated in the UL Scientific conference, and two regular scientific conferences DBIS (Digital Business and Intelligent Systems) conference in applied computer science and the Estonian-Latvian computer science Theory Days in Mathematical Computer Science.

The annual UL Scientific Conference in Computer Science and Information Technology is organized jointly by all research directions of the UL Faculty of Computing and Institute of Mathematics and Computer Science in order to promote interaction between different fields of science, while the Department of Mathematics organizes five sections within the annual UL Scientific Conference. For example, in 2021 at two sessions of Computer Science at the UL Scientific Conference, 16 papers on quantum computing, big data, cognitive science, biomedicine, language technology, data quality, and machine learning were presented with a wide range of topics included in each session (SAR, p.197).

Teaching staff and doctoral students of the Department of Mathematics have actively participated in the organization of several international scientific conferences, for example, the 20th international conference Mathematical Modelling and Analysis (MMA, 2015, Sigulda), 10th international conference Progress on Difference Equations (PODE, 2016, Riga), 10th international symposium European Symposium on Computational Intelligence and Mathematics (ESCIM, 2018, Riga), etc. (SAR, p.197).

One member of the academic staff involved in the current doctoral study program implementation is Co-Editors-in-Chief, 4 members are Area Editors, and 5 members of the academic staff are Editorial Board Members of the Baltic Journal of Modern Computing.

Conclusions on this set of criteria, by indicating strengths and weaknesses

Conclusions
There is a conviction that the study process is successfully implemented in the LU. The competencies of the academic staff in the study field are relevant. The teaching staff employed in the study program cooperate in the development and implementation of joint research work and projects, organize scientific conferences and seminars, conduct doctoral thesis, and are involved in the editorial board of a peer-reviewed international journal. The Faculty has developed a good culture of internal collaboration in the form of seminars.

Strengths:
1. The academic staff involved in the implementation of the doctoral study program ensures the acquisition of high-quality theoretical knowledge and research skills in the fields of computer science and mathematics
2. Academic staff involved in the implementation of the doctoral study program participated in the implementation of research-related projects both at the international and national levels.
3. There is a conviction that the study process is successfully implemented in the UL.

Weaknesses:
1. The rights of four (from 9) experts expire in 2023 in the field “Computer science and informatics”, and the rights of three (from 5) experts expire in 2023 in the field “Mathematics”.
2. The rights of 3 experts involved in the Computer Science and Informatics Promotion Council in the sub-field of Electronics, electrical engineering, and information and communication technology

exceed until the end of 2023 (02.12.2023). For this reason, the Council will not fulfill the requirements of Minister Cabinet Regulation Nr. 1001 after 02.12.2023.

Assessment of the requirement [7]

1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

Assessment of compliance: Fully compliant

The qualification of the academic staff complies with the requirements specified in the Law of Higher Education Institutions, the Law of Scientific Activity, and UL regulatory documents, as well as with the conditions for the implementation of the study program. Outlined weaknesses are included to draw management's attention to the implementation of necessary improvements. Despite the shortcomings/weaknesses mentioned, the qualification of the academic staff is assessed as fully compliant.

2.5. Assessment of the Compliance

Requirements

1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard

Assessment of compliance: Not relevant

2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

Assessment of compliance: Not relevant

3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561 , Paragraph two and Section 562 , Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Fully compliant

Attached study course descriptions (VI-10 Annex Descriptions of study courses of the study programme.docx) comply with regulations set forth in Law on Higher Education Institutions.

The attached study course descriptions are prepared in the languages (Latvian and English) in which the doctor study program is implemented.

4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

Assessment of compliance: Fully compliant

The provided Diploma sample (VI-1 Annex. Example of a diploma issued for completing the study programme.zip) complies with the criteria set in the Minister Cabinet regulation No.202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”. But faculty

management should pay careful attention to the information mentioned in Clause 16. The size of the diploma, except for the cases mentioned in Clause 17 of these regulations, must be an A5 page (148 x 210 mm).

5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

Assessment of compliance: Not relevant

6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

Assessment of compliance: Not relevant

7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

Assessment of compliance: Fully compliant

The attached Certification by the Head of Direction (VI-7. annex. Certification of Head of Study Direction (1).edoc) affirms that the academic staff of the doctoral study program complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions. But the management of the faculty should pay attention and initiate the extension of the expert's rights whose rights expire in 2023, as well as review the composition of the Computer Science and Informatics Promotion Council in the sub-field of Electronics, electrical engineering, and information and communication technology.

8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

Assessment of compliance: Fully compliant

The attached Annex II-13. annex. Certificate of the Head of the study direction regarding state language proficiency of teaching personnel.edoc. Certificate of the Head of the study field regarding state language proficiency of teaching personnel (signed on 09.10.2022) affirms that the knowledge of the official/national language of the academic staff involved in the implementation of the study program complies with the Regulations on the extent of knowledge of the national language and the procedure for testing the knowledge of the national language for performing professional and official duties.

9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

Assessment of compliance: Fully compliant

The attached Certificate of the Head of the study direction regarding English language proficiency of teaching personnel (Signed on 09.10.2022, Annex II-13a) and List of teachers involved in the implementation of programs of the study field (lecturing in study courses) in

2021 (Annex II-11) confirm that English knowledge level of the teaching staff involved in the implementation of the study program is B2 and higher.

10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

Assessment of compliance: Fully compliant

The attached Templates of Study agreements (II-3.annex. Templates of study agreements.zip) comply with the requirements set in the Minister Cabinet regulation No.70 “Studiju līgumā oblgāti ietveramie noteikumi”.

11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

Assessment of compliance: Fully compliant

According to the Agreement between LU and Riga Technical University (signed on 04.02.2021, II-33. annex. Agreements with RTU on students take over in case of cancellation of study programmes.zip). Agreements with RTU on students take over in case of cancellation of doctoral study programs) Riga Technical University undertakes to provide opportunities for continuing studies in the Riga Technical University study field "Information technology, computer engineering, electronics, telecommunications, computer management, and computer science" in one of the doctoral study programs - "Computer systems" (51481), "Information technology" (51481) or "Automatics and computer engineering" (51523).

12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme’s license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

Assessment of compliance: Fully compliant

The attached Annex II-32 (II-32. annex. Proof of compensation by the Rector.docx) “Proof of compensation by the Rector” (Riga, 28.12.2021. , No 1-13/831) affirms that students are guaranteed compensation for losses if the study program is not accredited or the study program’s license is revoked due to the actions of the higher education institution and the student does not wish to continue studies in another study program.

13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

Assessment of compliance: Not relevant

14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

Assessment of compliance: Fully compliant

The information provided in SAR and the attached document “Compliance to requirements for doctoral programme.docx” affirms the compliance of the doctoral study program to the requirement set in Section 63, paragraph 1 of the Law on Higher Education Institutions and Minister Cabinet Regulation Nr.1001 “Zinātniskā doktora grāda piešķiršanas (promocijas) kārtība un kritēriji”.

The powers of the Faculty of Mathematics Sciences Promotion Council have been approved until 2025. The council promotes and awards a scientific doctoral degree: Doctor of Science (Ph.D.) in Natural Sciences.

The powers of the Computer Science and Informatics Promotion Council have been approved until 2024. The council promotes and awards scientific doctoral degrees in two groups of branches of science: Doctor of Science (Ph.D.) in Natural Sciences, and Doctor of Science (Ph.D.) in Engineering and Technology.
The council includes at least five scientists who have the right of an expert of the Latvian Science Council in the field of science, two of them in the sub-field of science in which the doctoral thesis is defended.

The term of office of the Council does not exceed six years. The council operates in accordance with the regulations approved by the UL.

Assessment of the requirement [8]

1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

Assessment of compliance: Fully compliant

The doctoral study program complies with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments. However insignificant shortcomings have been identified, please see doctoral study program analysis, recommendations and general occlusions.

General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme

Conclusions
The doctoral study program is interdisciplinary, well included in the study field and its title is compliant with the study field. The doctoral study program can be delivered in both Latvian and English, targeting international students. The doctoral study program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. Unfortunately, the cooperation between the subprograms is weak and there is a low thesis yield.

A small number of students have graduated from the doctoral study program with a Doctoral degree in the last 6 years (25% of those who started studies in the doctoral study programs). A small number of international students enrolled in the program (only two students in the last six years).

Two separate doctoral councils (Computer Science and Mathematics) continue to serve students of one doctoral study program with unclear strategies on how to serve interdisciplinary doctoral research topics.

The resources are sufficient for the implementation of the doctoral study program. The finances are balanced, however, a mechanism to aid international students to cover their fees is lacking.

The qualification of academic staff involved in the implementation of the current program complies with the requirements. They actively implement scientific activities. The Faculty has developed a good culture of internal collaboration in the form of seminars.

The doctoral study programme is composed from two joint subfields (computer science, mathematics) who appear to have little to no cooperation/ interaction. The mathematical topics approached within the doctoral study programme are mainly statistics, applied differential equations and modelling of neural networks, that seem more appropriate to be covered by the name “Applied Mathematics”. The doctoral study programme exhibits a very high student dropout/ all-but-thesis rate. A small number of students have graduated doctoral study programme with a Doctoral degree in the last 6 years (25% of those who started study in the doctor study programmes). Two separate doctoral councils (Computer Science and Mathematics) continue to serve students of one doctoral study programme with unclear strategy on how to serve interdisciplinary doctoral research topics. So, the analysis of the reasonability of two separate doctoral councils should be done and potential obstacles for interdisciplinary doctoral research topics addressed.

Strengths
1. The program is interdisciplinary, covering computer science, electronics, and mathematics.
2. The doctoral study program leads to the implementation of long-term development of society and industry.
3. Doctoral students in the program have the opportunity to participate in Horizon 2020 and other EU research projects, as well as publish students’ research results in the Baltic Journal of Modern Computing, which is indexed in the Web of Science and SCOPUS.
4. Most doctoral students are employed in research projects on the topic of their thesis.
5. The small number of students in the doctoral study program, combined with a wide range of specializations and elective courses available both in an auditorium and e-learning formats, allows for student-centered learning and teaching principles to be applied.
6. Academic staff involved in the implementation of the doctoral study program participated in the implementation of research-related projects both at the international and national levels.

Weaknesses
1. The DSP is composed of two joint subfields (computer science, and mathematics) that appear to have little to no cooperation/ interaction.
2. The mathematical topics approached within the DSP are mainly statistics, applied differential equations, and modeling of neural networks, which, all, seem more appropriate to be covered by the name “Applied Mathematics”.
3. The program exhibits a very high student dropout/ all-but-thesis rate.
4. There are no mechanisms for how international students can cover their fees in cases it is needed.

Evaluation of the study programme "Computer Science and Mathematics"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Computer Science and Mathematics"

Short-term recommendations

1. Consider implementing a plan for better cooperation and integration of the sub-programs of the doctoral study program.
2. Consider implementing a consistent plan for the reduction of the student drop-out rate.
3. Pay attention and timely initiate the updating of the expert's rights whose rights expire in 2023.

4. Pay attention and timely initiate the updating of the expert's rights that are involved in the Computer Science and Informatics Promotion Council in the sub-field of Electronics, electrical engineering, and information and communication technology or change the composition of the Council to fulfill the requirements of Minister Cabinet Regulation Nr. 1001 after 02.12.2023.

Long-term recommendations

1. Consider renaming the doctoral study program to “Computer Science and Applied Mathematics”

III - Assessment of the Requirements for the Study Field and the Relevant Study Programmes

III - Assessment of the Requirements for the Study Field and the Relevant Study Programmes

Assessment of the Requirements for the Study Field

Requirements	Requirement Evaluation			Comment
R1 - Pursuant to Section 5, Paragraph 2.1 of the Law on Higher Education Institutions, the higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system:	Fully compliant			The UL complies with all the requirements of the criteria since it ensures continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system, as justified in the sub-criteria below. Improvements can still be made in the way of conducting graduate employment surveys and in the documentation of the feedback to stakeholders.
R2 - Compliance of scientific research and artistic creation with the level of development of scientific research and artistic creation (if applicable)	Fully compliant			Relevant research is performed by the studies programmes teaching staff, and student's involvement in research is sufficient. However, the number of publications indexed in Scopus and WoS is decreasing. There are no systematic mechanisms for bachelor and master-level students' involvement in the research. Even though experts identified some weaknesses, they are only for improvement, and doesn't affect evaluation.

Requirements	Requirement Evaluation			Comment
R3 - The cooperation implemented within the study field with various Latvian and foreign organizations ensures the achievement of the aims of the study field.	Fully compliant			The FC has developed very good cooperation with Latvian employers who are satisfied with students' knowledge and skills level. The FC participates in international research projects. A positive trend in the growth of the number of international students is achieved. For improvement of the study field FC needs to develop a proactive strategy to attract international students and teachers, onboarding activities for foreign students should be reviewed in order to ensure their smooth integration into the study process and improve their study experience and Erasmus program's motivation activities (case studies, work groups, seminars) for FC students should be planned and implemented in order to increase numbers of outgoing Erasmus students.
R4 - Elimination of deficiencies and shortcomings identified in the previous assessment of the study field, if any, or implementation of the recommendations provided.		Partially compliant		The FC has proven that it considers quality insurance seriously, by balanced and transparent analysis of the recommendations received on previous accreditations or licensing. Some of the previous recommendations have been considered and declared as solved, but the solving is only partial, as shown in the analysis above.

Assessment of the Requirements for the Relevant Study Programmes of the Study Field

No.	Study programme	R5	R6	R7	R8	Evaluation of the study programme (excellent, good, average, poor)

No.	Study programme	R5	R6	R7	R8	Evaluation of the study programme (excellent, good, average, poor)
1	Programming and computer network administration (41483)	Not relevant	Fully compliant	Fully compliant	Partially compliant	Good
2	Computer Science (43483)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Excellent
3	Computer Science (45483)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
4	Computer Science and Mathematics (51483)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good

The Dissenting Opinions of the Experts

none