Expert group joint opinion

Evaluation Procedure: Assessment of Study Field

Higher Education Institution: Riga Technical University

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

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

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The study field is extensive, covering multiple programs, at all levels and implementation types (academic/ professional, Latvian/ English teaching language). The structure of the field is clear. The description of the assessment procedure for each course is detailed and well-grounded. The advanced plagiarism control system is established. However, the study direction development plan lists no quantitative indicators.

A quality assurance system is in place and supported by the university and department-level management. The procedures for the development and review of the relevant study programs of the study field have been defined and the feedback of students, employers, and graduates are taken into consideration. However, not all stakeholders are equally informed about the possibility of feedback and their impact and a partial lack of systematic QA excellence approach is evident in processes of critical assessment of the initiatives for the development of new study programs

The mechanisms for collecting student complaints and suggestions are established and national as well as international students are in use and functioning. All the required elements of data collection are established by the RTU. Improvements can be introduced. Information in Latvian is available and the main information is in English. It could be helpful for international students to get more accurate and timely information in English.

ESG standards for teaching and learning (e.q. student orientation and meaningful learning-outcomes implementation) are not fully implemented yet. Feedback mechanisms are not fully exploited, e.g. student feedback loop.

The mechanism developed for the submission of student complaints and suggestions is in place but can be improved and students need to be more informed, not just about such an opportunity (which is established) but also to receive feedback on what has been implemented based on their evaluations and complaints.

The data collection mechanism for the purpose of QA could be further improved towards the automated and regular collection and analysis of information (statistics) on the study programs corresponding to the study field.

RTU is committed to establishing itself as an important research hub, on national, regional, and European levels. The teaching staff and researchers within RTU have good international cooperation. RTU has developed a strategic and procedural framework for the planning and realization of research that is inclusive with respect to the university’s academic community and outbound towards the industry. The research realized within the study field of “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science” is well connected to all the international research themes. The RTU includes the Faculty of E-Learning Technologies and Humanities (FETH), which, as one may expect and research reports document, is strongly involved in numerous projects aimed at delivering innovative pedagogical means that integrate technology at university-level teaching. Yet, as discussions with academic staff from various study programs showed, there is no consistent evaluation of the multimedia/ online content prepared for the disciplines and no specific guidance in implementing innovative teaching. The institution is committed to significant efforts toward research; management has set research performance-based KPIs from the faculty level down to the individual staff level. Research is

conducted with input from students and staff.
However, there are some unsolved issues, e.g. decrease in the number of publications in recent years should be investigated; research results are not well promoted internationally due to issues with institutional websites; the transfer of research into the industry (via patents) and back to the study process could be improved; transfer of research results obtained within RTU from the area of e-Learning Technologies is insufficiently transferred into the RTU teaching process.

Cooperation within Latvia is established through various formal and officially required means and the cooperation contributes to the implementation of the study programs. Well-established cooperation within Latvia with many relevant employers, employers' organizations, non-governmental organizations, and scientific institutes. Cooperation with employers ensures internships, and internship supervisors, and offers supervision and review of the thesis.

International cooperation is in the strategic plan of the RTU and there is evidence of international cooperation activities in the form of projects and mobility. A stronger relationship between goals of internationalization, especially those related to aims and learning outcomes of study programs, and evidence of their fulfillment is missing. An increase in the outgoing mobility of teachers and students is evident. Teaching staff and students participate in both outgoing and incoming mobility, which could provide added value to the implementation of the study process and the quality of studies. The RTU uses available EU programs and initiatives. University cooperates with institutions from abroad (mainly higher education institutions/ colleges, and scientific institutes but also with professional international organizations) within the framework of the study field. The RTU has developed a system and procedures for the attraction of students from abroad within the study field and the system is moderately effective. Teaching staff and students participate in both outgoing and incoming mobility, which can provide added value to the implementation of the study process and the quality of studies.
However, cooperation is not fully exploited to contribute to the achievement of the aims and learning outcomes of the study field and the relevant study programs. Cooperation with industry is not fully exploited through graduate surveys and employers' surveys. They are conducted annually, but have a low participation rate and are weakly structured to provide meaningful input to improve the content of the study programs. There is still the problem of recognition of a student study period abroad because students' learning agreements are not prepared on time or courses enrolled abroad are not fully recognized at RTU.

The University has seriously considered the past recommendations and has taken concrete action toward implementing them. Even if not all past recommendations have been implemented, the University has laid out a track for doing so in a set time horizon. However, 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. Unfortunately, some recommendations have been considered or deferred for future consideration/implementation.

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 with the program team during the visit to RTU on Oct. 24-28, 2022.

The main goal of the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science” is to fulfill the agenda of digital transformation of Latvia and to attain regional technological leadership by adopting excellent research, modern interdisciplinary studies based on cross-border cooperation, and effective interdisciplinary cooperation through joint development initiatives as the main driving force.
In the study field, 26 programs are directed for accreditation, and these programs are implemented by 4 different organizational units, making the study field one of the largest in the country, and the actuality of the study field grounds on the high demand for ICT (Information and Communications Technologies) specialists in the country. The study field is very large, covering multiple programs, at all levels and implementation types (academic/ professional, Latvian/ English teaching language). At the same time, the study field has been optimized by 12 study programs not being put for re-accreditation.
The study programs of the field cover all educational levels from bachelor to doctoral programs. The main study areas of the field are computer systems, information technologies, intelligent robotics, telecommunication, and electronics, and the programs cover the full range of the field with a wide diversity of opportunities to choose the appropriate program. In addition to the programs from the main study areas, there are several specialized and/or interdisciplinary ones.
The positioning of study programs is clear – on the one hand having their own specializations, and on the other hand, implement common courses together.

1.1.2. The analysis is based on SAR (section 2.1.2) and meetings with the program team during the visit to RTU on Oct. 24-28, 2022.
SWOT factors have been identified and analyzed. The main strengths are highly qualified staff, as well as the high demand for professionals in the field. The main challenges are attracting new members of academic staff and attracting students for postgraduate programs.
Following the SWOT analysis, an elaboration of the Study direction development plan was carried out to identify specific activities to achieve the goal of the field. For that purpose, a working group was formed, which mainly included study program directors who are personally responsible for the implementation of the activities.
The Study direction development plan lists and briefly describes the main activities.

1.1.3. The analysis is based on SAR (section 1, section 2.1.3) and meetings with the program team during the visit to RTU on Oct. 24-28, 2022.
The Study Field Committee serves as the main managerial structure of the study field. It includes the directors of the study programs, industry representatives, leading members of academic staff, as well as student representatives and is headed by the head of the study field. The quality of each study program is ensured by the head of the program, while the academic staff is responsible for individual courses.
The responsible person for a study program is the head of the program supported by the administration of the faculty, which i.a. constantly monitors the compliance of the premises and technical equipment with modern quality requirements. The heads of study programs are responsible for considering the received recommendations, complaint treatment procedures, and achieving the aims of the programs. If changes should be made to the courses or to the program, the Study Field Committee addresses the faculty councils to review and approve the changes, which are then subject to be approved by the RTU Senate.
Documentation and discussions during the meetings show that the decision-making process is efficient, but it may differ depending on the program (see specific program evaluations).
Documentation and discussions during the meetings show that the administrative and technical support is sufficient.

1.1.4. The analysis is based on SAR (section 2.1.4, 2.1.5) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
The admission process is centralized for the university. Admission requirements are logical, understandable, and linked to the goals defined in the RTU Strategy. The description of the procedure is concise and clear. A very important criterion for admission is knowledge of Mathematics - applicants with a CE in mathematics of less than 15 percent may get enrolled only for tuition fees. Applicants of some study programs should pass an entry test. 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 RTU is carried out in accordance with the "Regulation on the Recognition of the Courses Completed at Other Universities and RTU Study Programmes" and the "Procedure for Recognition of Competencies Developed Outside Formal Education or From Professional Experience and Learning Outcomes Achieved in Previous Education at Riga Technical University".
RTU Admission Regulations are published at https://www.rtu.lv/lv/studijas/uznemsana/uznemsanas-noteikumi (for local students) and at http://fsd.rtu.lv/ (for foreign and exchange students).

1.1.5. The analysis is based on SAR (section 2.1.6) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
In each course description separately, the set of relevant knowledge, skills, and competencies and their evaluation system, defined learning outcomes for the achievement of which credit points are awarded have been defined. Assessment of students' achievements according to the defined learning outcomes is carried out in accordance with the RTU "Regulation on the Assessment of Learning Outcomes".
Criteria for grading in the study courses are published on ORTUS e-study system beforehand, including certain weights in the final grade. One of the principles is that the final exam grade may not exceed 50% of the final grade.
Courses and seminars on the newest pedagogical methods are organized regularly to improve the professional-pedagogical competencies of teaching staff.

1.1.6. All the graduation papers should be uploaded to the ORTUS system and undergo plagiarism control by several tools in parallel. When students draft their graduation papers, they are instructed about plagiarism and its consequences several times.
The procedures of how to process academic integrity issues (reporting, reviewing, etc.) have been defined.
Methodological materials have been issued containing detailed instructions on the correct presentation of references in students' works.

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

Conclusions
The study field is extensive, covering multiple programs, at all levels and implementation types (academic/ professional, Latvian/ English teaching language). Although having plenty of programs covering most of possible main specializations, the study field is well organized and implemented. The institution have identified and analysed SWOT factors. Important actors to implement needed activities of development of the field are study programme directors. The main managerial structure of the field is The Study Field Committee. Admission and recognition processes are clear. Most of the

criteria to fulfil study requirements are defined by individual courses, the are accessible in the ORTUS system. Graduation papers are managed in a centralized manner including plagiarism control system.

Strengths:
1. Clear structure of the field.
2. Clear description of the assessment procedure for each course.
3. Advanced plagiarism control is carried out.

Weaknesses: None

1.2. Efficiency of the Internal Quality Assurance System

Analysis

1.2.1. The analysis is based on SAR (section 2.2.1) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
The RTU has established a quality policy that is publicly available. The main governing body (Senate) approved document defining broad principles and values of the internal quality policy is the "RTU Quality Policy", while the "RTU Excellence Approach" expands upon those principles and sets quantitatively measurable KPIs. The RTU has developed and maintains a quality assurance (QA) system. Although within RTU Excellence Approach there are affirmed principles of having an "RTU Action plan", implementing the Excellence Approach by following "Systematic, Process-Oriented Action" and striving towards "Continual Improvement" by conducting "Process and Results Analysis" it is not always clear how it contributes to the achievement of the aims and learning outcomes of the study field and the relevant study programs. As there are cases when there are clearly identifiable issues that could be solved by following those defined principles. Those cases are, for example, a mismatch of some particular course outcomes with learning outcomes of study programs, study course descriptions despite the fact that they go through numerous hoops of approvals - contains clearly unrealistic amounts of literature listed as mandatory. The system partially ensures continuous improvement, development, and efficient performance of the study field and the relevant study programs. In reality, study quality (as the quality of the study process) in many cases rests on the individual initiative of lecturers within the scope of their respective courses.
In the Self-Assessment Report (SAR) of the RTU, it is stated that RTU has an internal quality management system in place in accordance with the RTU Quality Policy updated and approved by the RTU Senat.
Answers from the RTU management during the assessment visit suggested that the QA system is developed but the meaningfulness and comprehensive approach and use of QA could be further analyzed and improved. QA policy exists but a concrete QA implementation handbook is not publicly available. ESG is considered in the documentation as a reference point for QA at the RTU, but teaching and learning standards, based on learning outcomes, are not at the forefront of QA (conclusion based on assessment visits/interviews).

1.2.2. The procedures for the development and review of the relevant study programs of the study field and the feedback mechanisms (including feedback to students, employers, and graduates) have been defined and they are in general logical, and available for all stakeholders. Although the procedure and review process has been defined, a partial lack of a systematic QA excellence approach is evident in processes of critical assessment of the initiatives for the development of new study programs. There are study programs where crucial several core topics of the domain are not covered at all (in the case of "Cybersecurity Engineering"). Or the English title of the study program is misleading as indicated by opinions of students and graduates in the case of "Logistics and Supply

Chain Management". There seems to be an issue that in some cases chosen study program ISCED code can be replaced by more thematically suitable code in accordance with relevant regulatory enactments. Hence, these non-exhaustive examples demonstrate that there is room for improvement regarding QA implementation within study program development and review procedures.
There seems to be a common theme in student feedback regarding some study programs that, for example, the curriculum is, in their opinion, outdated or irrelevant to study subjects. This sentiment, therefore, indicates that either student feedback is not taken into account in a continuous manner or there is a lack of feedback to students explaining the reasoning why these concerns are not being addressed or are, in fact, not subject to change from the management of the study program by providing an explanation of its topical necessity for a successful learning process. Consequently, feedback mechanisms to students are not sufficiently effective and indicate potential room for improvement.
But all stakeholders need to be encouraged to use self-evaluation procedures (e.g. preparing SAR, discussion on the evaluation visit) more critically and in a criteria-based manner to ensure that QA processes provide meaningful and useful results for improvement, not just another administrative burden.
In the SAR it is stated that continuous improvement of the quality of studies and participation of students are established in accordance with the ESG.
On a managerial level, there is a focus on research as a central QA area (research seems to be strong) and other areas (e.g. teaching and learning, internationalization) are put behind. That approach is reflected in the poor use of learning outcomes at the level of study programs which is mostly content-based, learning design, and constructive alignments based on learning outcomes and student-centered learning. It can be noticed in the documentation as well as in discussions with management and teachers.
In the SAR it was pointed out that the responsibility for QA is on departments, but based on the evaluation visit it was not clear what is the division of the QA tasks between departments and the university management. As in RTU Quality policy, it is defined that the responsibility for implementation of QA procedures rests on the heads of departments and administrative entities. Efficiency and obligations are not entirely clear.
For example, which level is responsible for providing and monitoring the personal development of teaching staff? Training material and opportunities are to some extent provided at the university level, but nobody monitors the process and provides specific training to close the knowledge gaps.
The employers are participating in the QA process but discussions with employers related to study programs pointed out that it is not at the same or satisfactory level for all study programs.
External stakeholders in SAR include employers and NGOs which could have a positive impact on the quality of study programs and the general third mission of the university (serve society).

1.2.3. The elements of submission of student complaints and suggestions are in place, as is also stated by students during the assessment visit, which can promote the implementation of improvements, but students are not always informed about such an opportunity and receive feedback.
(SAR, 2.2.3) stated that a new document was approved in 2019 and now student complaints and proposals are considered in compliance with the "Procedure for Submission and Examination of RTU Students' Proposals and Complaints". It includes that The student may submit the Application electronically or in person at RTU Career Support and Service Center under the full name and ID of a student complying. Complaints need to be answered in 10 working days.
According to (SAR, 2.2.3) a total of 43 complaints/proposals have been received between September 2021 and May 2022, none of which were submitted anonymously. Of the submissions, 32 were complaints and problems, and 11 were suggestions for improvements. Students were provided with

answers.
Besides the above-mentioned complaints procedures that students submit under their names, there is also the possibility for students to provide feedback anonymously via surveys. Student and graduate surveys are organized regularly, but the response rate is rather low and in the majority of cases students haven't been informed about the implementation of findings. Positive is that some teachers have been discussing results from the previous semester and commenting on what has changed and why.
Dissemination of QA procedures and their aims can be improved. For example, non-academic departments are not aware of QA processes related to students' participation in QA, e.g. how feedback from students is collected and used.

1.2.4. Self-Assessment Report (SAR) covers all required elements. Even though they reported the use of data analytics (e.g. Power BI), as in many other HEIs, it is the most challenging part of the preparation of SAR for gathering data to support evaluation (reported during the evaluation visit). It indicates a need for upgrading the RTU information system to provide information and analysis relevant to accreditation as well as monitoring strategic development.
Besides questionnaires (surveys), other forms of collecting student data can be more extensively used. Especially because surveys have problems with the response rate since students' motivation to fulfill surveys at the end of the semester, when the course is finished and individual students will not feel changes, is rather low. Yet there are other practices on how to collect data - e.g. student focus groups, targeted meetings, small-scale surveys, discussion forms on campus and online, mid-term surveying, etc. The student feedback rate/scope/quality/amount should be KPI in itself.
QA is a two-way street and the importance of feedback should be emphasized at all levels and QA processes. In that respect, good examples from different study programs need to be gathered, shared, upgraded, and widely used. At the level of the RTU short evaluation report based on student's feedback, and discussion with students' representatives (Students Parliament) might be issued each year with the most important findings and what is going to be implemented.
The RTU takes care about assuring the qualifications of the academic staff and the work quality and in interviews on all levels management and teachers declare that equal attention is given to research quality and quality in teaching and learning. Nevertheless, the quality of teaching is mainly associated with the use of technology and students' feedback and not with providing opportunities for training in meaningful use of learning outcomes in course learning design.

1.2.5. Information in Latvian is available as well as main information in English. Information in English is available, but according to (SAR 2.2.3) international students have asked for more support in the study process and provision of information in English, the schedule of lectures is often not available, etc.

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

Conclusions
The RTU QA system is in place and supported by the university and department-level management.
The procedures for the development and review of the relevant study programs of the study field have been defined and the feedback of students, employers, and graduates is taken into consideration. Not all stakeholders are equally informed about the possibility of feedback and their impact and a partial lack of systematic QA excellence approach is evident in processes of critical assessment of the initiatives for the development of new study programs.
The mechanism for collecting student complaints and suggestions is established and national as well as international students use it.
All the required elements of data collection are established by the RTU. Improvements can be

introduced.
Information in Latvian is available and the main information is in English. International students sometimes need more accurate and timely information in English.

Additionally, a careful analysis of compliance with ESG standards is needed. Especially, meaningful and consistent use of learning outcomes for planning, monitoring, and evaluation of teaching and learning activities.

Strengths:
1. The RTU established a QA policy and a QA system is in place. Research quality is recognized as essential.
2. The procedures for the development and review of the relevant study programs of the study field and the feedback mechanisms (including feedback to students, employers, and graduates) have been defined and all stakeholders' perspectives are taken into consideration, or at least there is an open possibility for that.
3. Continuous improvement of the quality of studies and participation of students is established in accordance with the ESG.
4. The elements for submission of student complaints and suggestions are in place and students can give comments and suggestions.
5. The data collection mechanism for the purpose of QA is established by the RTU.
6. Systems for students' complaints and suggestions are in place and students use them.

Weaknesses:
1. ESG standards for teaching and learning (e.q. student orientation and meaningful learning outcomes implementation) are not fully implemented.
2. In practice, some feedback mechanisms are not fully exploited (e.g. student feedback loop).
3. The mechanism developed for the submission of student complaints and suggestions can be improved and students need to be more informed, not just about such an opportunity (which is established) but also to receive feedback on what has been implemented based on their evaluations and complaints.
4. The data collection mechanism for the purpose of QA could be further improved towards the automated and regular collection and analysis of information (statistics) on the study programs corresponding to the study field.
5. International students complain about the availability and promptness of information in English.

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

RTU ensures the continuous improvement and development of the study field.

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

RTU has established QA policy and procedures, however, In practice, some feedback mechanisms are not fully exploited (e.g. student feedback loop). Moreover, the data collection mechanism for the purpose of QA could be further improved towards the automated and regular

collection and analysis of information (statistics) on the study programs corresponding to the study field.
The current implementation is sufficient to be fully compliant, but taking into account the high number of programs and students, further improvements are recommended.

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 mechanism for the development and review of the study programs has been defined and the feedback of students, employers, and graduates are considered. Not all stakeholders are equally informed about the possibility of feedback and their impact. To some extend lack of systematic QA excellence approach is evident in processes of critical assessment of the initiatives for development of new 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 process for the reassurance of the achievement of the intended learning outcomes is developed and published.

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

Internal procedures and mechanisms for the academic staff competences are in place.

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

Relevant information is collected and analyzed resulting in the study field programs improvement.

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

QA is used to improve the study field.

1.3. Resources and Provision of the Study Field

Analysis

1.3.1. RTU funding from the state's basic budget for the provision of study seats in the respective academic year is distributed by the decision (approved methodology) of the RTU Senate. According to the self-assessment information provided by RTU, the methodology for funding allocation is reviewed every year and approved in the new edition taking into consideration the necessary changes. For instance, there is clear evidence that the RTU Senate approved the methodology for

allocating and applying funds to RTU units in the academic year 2021/2022 (“Methodology for the Allocation and Use of Funding for the Organizational Units of RTU in Academic Year 2020/2021”, 28.06.2022., Minutes No 651). It should be noted that this methodology includes not only a system for the implementation of study processes, but also a description of the funding distribution system for funding scientific and applied research, and artistic creation.

Examination of the information provided in the "Funding distribution between the cost items" document and the insights gained during the interviews and the visit does not show a clear link between the individual funding distribution positions and the actual situation.
1) Infrastructure costs per 1 student of doctoral study programs are significantly higher than infrastructure costs for 1 master's or bachelor's student. The visit did not give a clear impression of the effectiveness of these costs. On the contrary, there are concerns that doctoral study seats that receive increased funding from the state are being used to finance processes unrelated to the implementation of those study programs. The most uncertain aspect is the infrastructure cost per student of the E-learning Technology and Management doctoral program.
2) Funding for the “Purchase and modernization of equipment” can be described as relatively low - less than 1% for almost all programs from total costs per 1 student, especially for study programs (e.g. Technologies and Data Transmission Engineering, Transport electronics and telematics, and Smart Electronic Systems) that rely on technical facilities. For example, 1.10 EUR is the cost for the purchase and modernization of equipment per student of the professional master study program “Transport electronics and telematics. Such an amount per student is critically low. In addition, during the visit, it was identified that certain facilities at the Faculty of Electronics and Telecommunications (FET) can be described as outdated. Taking into account the financial data submitted and the findings of the on-site visit, it can be concluded that the funding estimated and allocated for the purchase and modernization of equipment is insufficient in certain cases, in particular for the FET. Although one can argue that the reduced funding is caused by limitations of the total budget, there is a clear imbalance between funding for the “Purchase of books and magazines” and the “Purchase and modernization of equipment”, which raises concerns about the efficiency of the distribution of funding. For example, for the professional master study program “Transport electronics and telematics” funding distributed for the “Purchase of books and magazines” per student is 142.22 EUR which is more than 100 times higher than funding for equipment purchase and modernization (1.10 EUR per student). The situation is similar for other study programs.

1.3.2. The study field is implemented in a modern, multifunctional campus. The infrastructure of Ķīpsala Campus provides students, staff, and guests with all the necessary services and utilities, e.g., it is possible to park a bicycle and a car, quench one’s thirst at water drinking points free of charge. Developing the infrastructure, care is taken of all groups of people, including people with disabilities: each building has dedicated parking lots, easy access to classrooms, laboratories, and other facilities, the use of Braille to provide essential information, as well as all sanitary facilities are designed according to the requirements. According to the self-assessment report, the association of people with disabilities and their friends APEIRONS (https://www.apeirons.lv/) commends RTU for its achievements in infrastructure-related issues for people with disabilities.
The study field covers three faculties - the Faculty of Computer Science and Information Technology (FCSIT), the Faculty of Electronics and Telecommunications (FET), the Faculty of E-Learning Technologies and Humanities (FETH), and Riga Business School (RBS). Although all faculties share a common study field, significant differences were identified regarding the quality of technical provision. In general, FCSIT is based on recently renovated and established facilities. While a significant amount of facilities of FET can be characterized as outdated. During the visit, it was identified that the policy and quality standards of the study environment strongly differ between

FCSIT and FET. A unified system and procedures were not identified for the improvement and purchase of material provision. Although the representatives of the management claimed that all facilities are shared between both faculties, no practical evidence of such collaboration was found during the meetings with students and teaching staff.
During the meetings with students, it was identified that facilities (e.g. laboratories) are easily accessible and are also available after the formal study time (e.g. lecture time). Moreover, there are several facilities available for design and prototyping for all students and teaching staff.
The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.

1.3.3. The analysis is based on SAR (section 2.3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
Methodological and informative provision is based on the services provided by the RTU Scientific Library (SL). RTU Scientific Library is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure the RTU study process and research activities, as well as provides a library, bibliographic, and information services to RTU students, academic and general staff. The Library stocks more than 1.29 million printed documents and e-resources in RTU industry specific databases.
During the expert visit, it was identified that the library has an accessibility-based policy. The library is accessible to students 24/7 and its facilities are designed to provide adequate support for persons with disabilities. The extensive database is accessible remotely to the university staff and students through the ORTUS portal.
According to the SAR, there is a well-established process for the improvement and purchase of the methodological and informative provision. Based on the funding from the RTU, the library calculates funding for the information resources for each study program. The collection is updated based on the recommendations of the head of a respective study program and researchers. Required information sources can be ordered at the Library website by filling out an order form, an application form (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3), contacting by phone or by visiting the Library at 5-105 Paula Valdena Street. The Scientific Library offers a guide, which includes websites of various Latvian and foreign publishing houses and bookstores for searching publications and e-resources. During the meetings, no evidence to the contrary was identified. Library resources are sufficient for the study field needs.

1.3.4. The IT Department at RTU provides IT services for academic, scientific, and administrative processes. According to the SAR, the IT Department works in three areas: 1) design, development, and maintenance of an integrated RTU information system providing support for RTU administrative, academic, and research work; 2) provision of high-quality and continuous voice and data transmission services in the entire territory managed by RTU, as well as maintenance of RTU data centers and main network resources; 3)support in the use of IT services, including informing the users about new IT solutions, providing the necessary consultations and organizing IT training.

According to SAR, all IT users are provided access to the centralized portal ORTUS, which functions as a single digital gateway, combining information from all RTU information system components and providing users with an easy-to-use way of accessing the directory of all IT services in one place. During the visit, the experts concluded that ORTUS is a well-established system that is used by all RTU staff on a daily basis.
The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs. During the experts' visit, it was identified that the Moodle platform is widely used and accepted among the teaching staff and students.

The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.

1.3.5. According to the SAR, the implementation of RTU personnel policy is stipulated in the Human Resources Development Plan, which focuses on three main goals within the professional development of the academic staff: renewal of the academic staff, by promoting academic work of Ph.D. students, improvement of the professional competence of the existing academic staff and attraction of foreign academic staff.
During the meetings, management representatives acknowledged the difficulty of attracting junior-level staff, pointing out that the most effective way of attracting young professionals is through involvement in research activities. The evidence of this statement was found during meetings with both Ph.D. students and teaching staff. In both staff groups, there were identifiable successful cases of Ph.D. students becoming university staff.
Although it is claimed that one of the focus points of the HR policy is to attract foreign lecturers, neither in the self-assessment report nor during the expert visit was it possible to find evidence of any systematic action being taken to implement this point. However, during the expert visit, some cases were identified where foreign academics have been successfully recruited. These cases could be described as rather the results of individual actions not the results of a systematic plan.
The expert visit identified a sufficient number of cases of faculty members recruited from the industry or who combine teaching duties with daily work in the industry. It was difficult to assess during the visit whether there is a systematic approach to linking academics to industry, but in practice, the collaboration with stakeholders can be described as working and well-established. However, it should be noted that for some specific study programs, no link with industry was identified.

1.3.6. According to the SAR, at the end of 2018, the Centre for Academic Excellence (teaching and learning center) was established at RTU to support RTU academic staff (in the areas of pedagogical, intercultural communication, and self-development). Although the tasks of this center are dedicated to the professional and didactic development of the teaching staff, there was no clear evidence found that there is a systematic approach to increase the didactic skills of the teaching staff. Most members of the teaching staff were not familiar with modern teaching methods, and a list of academics claimed that the only professional development opportunity they had was the improvement of professional English skills.
Since 2019, RTU has been implementing a qualification advancement project in cooperation with the Ministry of Education and Science of the Republic of Latvia and the Ministry of Education of the Republic of Latvia, which provides for the training of academic staff of the leading Latvian universities at the University at Buffalo in the USA. The training program consists of two parts – (1) to acquire the teaching methodology from the position of the student and (2) to acquire the teaching methodology from the position of the educator. Each of the training stages lasts one semester in the U.S. Currently, there are 8 lecturers in the study field who have undergone or are currently undergoing training. During the expert's visit, the evidence was found that training at the University of Buffalo is delivering a sufficiently high return on teaching FCSIT staff development. However, the number of 8 is rather small over the 473 members of teaching staff covering the whole study field. It is important to note that members of FET were not taking part in any activities related to the training of academic staff at the University of Buffalo.
According to the abovementioned, it can be concluded that formally there is an academic staff development initiative, but in practice, academic development is characterized by distinguishable cases rather than systematic results.
Neither the self-assessment report nor the expert visit found any evidence of how the results and effectiveness of staff development are evaluated.

1.3.7. According to the SAR, RTU does not strictly delineate academic and research workload. Its proportion for each member of academic staff is determined individually, planning the employee's workload in the department, as well as taking into account their position, involvement in the implementation of projects, professional competencies, and experience. During the expert visit, clear evidence of the imbalance between academic and research workload was not found.

1.3.8. According to the SAR, RTU Career Support and Services Department provides students with a wide range of career and psychological support services. Support is differentiated by the target groups: 1) prospective students; 2) first-year students; 3) all RTU students; 4) foreign students; 5) students with special needs; 6) graduates; 7) staff.
According to the SAR, In 2014, the Student Services Centre was opened in Ķīpsala Campus. It ensures day-to-day support under the supervision of the Career Support and Services Department. ensures day-to-day support: 1) provides answers to various questions that students may have; 2) provides printing, copying, and binding services; 3) issues identification cards; 4) draws up references and transcripts, if necessary.
According to the SAR, In 2019, work was started on strengthening support for students with disabilities and in 2020 guidelines were issued with recommendations for effective communication and improvement of the study environment for people with disabilities and special needs. During the experts' visit, well-integrated infrastructure-level support was identified for people with disabilities and special needs.

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

Conclusions
Riga Technical University has an efficient and clear funding distribution system with few uncertainties about infrastructure maintenance and the purchase and renewal of equipment.
On average, the study field has good infrastructure and technical facilities. However, for some study programs, in particular at the Faculty of Electronics and Telecommunications, some of the equipment can be described as outdated. The technical facilities cannot be described as equally balanced between all study programs.
Methodological and informative provisions can be described as very good without any significant deficiencies.
The information and communication technology solutions used to ensure the study process are up-to-date and well-maintained. Very good IT support was established for both students and teaching staff.
As in all higher education institutions, there are problems in attracting qualified staff. However, RTU is successfully implementing a number of activities to attract qualified teaching staff. On the other hand, attracting foreign faculty cannot be described as very effective and well-implemented.
Formally there is an academic staff development initiative, but in practice, academic development is characterized by distinguishable cases rather than systematic results.
During the expert visit, clear evidence of the imbalance between academic and research workload was not found.
Riga Technical University has a well-established, functioning, and centralized student support system.

Strengths:
1. A well-developed and clearly defined financial distribution system is in place, which is reviewed and edited on an annual basis.
2. Well-planned and established campus-level infrastructure with a focus on sustainability and accessibility of all groups of society.

3. Technical facilities are accessible to students outside lecture hours.
4. An easily accessible library with a wide set of information materials and scientific databases.
5. A working practice is established where junior-level teaching staff is attracted through involvement in research activities during their studies.
6. Sufficient training of FCSIT academics has been carried out at the University at Buffalo in the USA leading to the increase of expertise in teaching methods used at FCSIT.

Weaknesses:
1. A significant amount of the technical facilities of the Faculty of Electronics and Telecommunications can be characterized as outdated and not well maintained.
2. Lack of unified system and procedures for the improvement and purchase of material provision covering the whole study field.
3. Mechanisms exist to attract qualified foreign academic staff, but their effectiveness cannot be described as high.
4. Activities of the Centre for Academic Excellence do not uniformly increase the expertise of academic staff in teaching methods covering the whole study field.
5. Training at the University of Buffalo covers only the part of the study field related to computer science, but not the study programs of the FET.
6. There is a lack of clear measures on how the results and effectiveness of staff development are evaluated.

1.4. Scientific Research and Artistic Creation

Analysis

1.4.1. RTU has established in its Constitution that research (and the associated innovation) is its second-most important activity ("Art. 1 [...] RTU implements interdisciplinary studies, innovation, and research."). This defining institutional feature is reflected in the areas of institutional activities (Art. 9, "9.2.high-quality scientific research, which includes the provision and development of a system of research excellence; 9.3.valorization – knowledge and technology transfer, commercialization and implementation of innovation, diverse cooperation with the industry in the fields of science determined as the areas of strategic specialization of RTU;"). As imposed by the Constitution, the Strategy of RTU delivers the goals and objectives in the implementation of the RTU's mission; the current strategy covers the period 2021-2025 (https://www.rtu.lv/writable/public_files/RTU_strategy_for_2121_2025_eng.pdf). The Strategy of RTU defines the main objective of the five-year period the "Excellence in research".
The study field under assessment contains professional and academic programs implemented in four faculties of the RTU: the Faculty of Computer Science and Information Technology (FCSIT), the Faculty of Electronics and Telecommunications (FET), the Faculty of E-Learning Technologies and Humanities (FETH), and the Riga Business School (RBS).
The research directions of the study field are clustered at the faculty level (being concentrated in the structural units of the faculties – departments, laboratories, or research groups established), corresponding to the academic freedom and the available competencies and interests of the academic staff. The Self-Assessment Report declares the specific research fields for the four faculties involved in the study field:
''FCSIT: Mass computing-rooted decision-making for growing companies of the digital age (general purpose information systems); Comprehensive intelligence for smart and autonomous systems and their integration (artificial intelligence and robotics); Transparent data processing (communication, computing, and management) in complex and distributed environments (business information systems); Mathematical modeling.
FET: Data transmission systems (optical, wireless, and quantum fiber) and their functional elements;

Metaphotonics solutions in optical communications and sensor technologies; Energy efficient solutions for high-security wireless sensor networks.
FETH: Digital humanities Terminology and terminotics Interdisciplinary research in humanities Linguistics, technical translation, and machine translation; Interdisciplinary research in e-learning technologies and social sciences.
RBS: Mathematical modeling, business statistics, and financial risk management; Strategic management of organizations, project management, and digital transformation."
As declared in the Self-Assessment Report, the research fields are established in the Strategies of the faculties, but the publicly available English-language documentation could not allow for verifying that claim. Still, the declared research fields correspond to the development goals of the higher education institution and are relevant for the study field and industry, at all bachelor/ master/ doctoral levels.
Professors and associate professors are re-evaluated every six years. Internal evaluations of scientific and pedagogic activities are carried out every two years. The doctoral study programs are significant and important for the scientific output of the HEI. The HEI implements two enabling mechanisms for doctoral research: doctoral research grants, and industrial doctoral programs. Both mechanisms improve the scientific output of the HEI. Scientific research is conducted in departments, laboratories, and research groups. The staff improves their pedagogic and scientific skills by visiting other HEIs as academic staff and visiting researchers.

1.4.2. The assessed study field, "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", is one of the most innovative and disruptive areas of current development in the world. Some of its most visible creations are the ubiquity of the Internet- and telecommunication services, digitalization of the society, provision of distance-independent and powerful machine learning and intelligence. Some of these features were highly used during the COVID-19 pandemic (online classes and teaching, both as a technical achievement and pedagogical approach) within all universities across the world, including RTU, so, one might consider that at some minimal level research was directly transferred into teaching.
Scientific research and the outcomes thereof are integrated into the study process in the study programs of all levels. The study field represents the largest in the HEI and provides access to research infrastructure and prototyping facilities (e.g., RTU Design Factory, FCSIT IKSA Center). Multiple research projects involve students at all levels.
In a more detailed analysis, one notices that the research (as an activity or as an outcome to be integrated) gets diluted as one descends from doctoral studies toward bachelor studies.
The Self-Assessment Report mentions several directions of integrating research into teaching: involvement of students in research projects (including the realization of their graduation theses), enabling students to perform independent (or group) research work within the laboratories and facilities of RTU, involvement of guest lecturers (with high-research profile) in academic courses.
During the discussions with various groups of students enrolled within the study field, the students mentioned that it is rather difficult to join the research activities, since (according to various study programs) the research is not popularized (especially at the bachelor level) and even getting subjects for the dissertation is in some cases the job of the student.
On average, the research is returned in learning, but not in a programmatic way and the accounting of the return is not always clear or easy to obtain (how many students were involved in a specific research program, in which visiting lecturers intervened (in what disciplines, with what subjects and when), which are the open positions for student researchers in projects, what chapters of disciplines were changed at a given time in order to integrate research results).

1.4.3. International cooperation in the field of scientific research within the study field and the relevant study programs is ensured and it is being purposefully developed. The HEI has

implemented about 300 different projects in the reporting period which has attracted considerable funding and expanded cooperation with the representatives of the Latvian and foreign industries. The total number of publications has increased by roughly 15% and has achieved a rating of 4 out of 5 in the International Evaluation of Scientific Institutions.
International cooperation in the field of scientific research is an important component of the research and internationalization directions of RTU (as established in the Strategy for 2021-2025). For the last reporting period covered in the Self-Assessment Report, the main relevant item regarding internationalization is measured by the number of international research projects in which the RTU components of the field of study "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" were involved. There are 10 projects within the EC frameworks (FP7, H2020) run from 2007 to 2022; RTU is also involved in the Erasmus+ cooperations, which can be seen as research relevant.
As stated in the Self-Assessment Report, "In accordance with the strategies of the organizational units implementing the study field and the common RTU Strategy, the activities in the study field will focus on: (1) the purposeful development of the academic and research infrastructure aimed at external cooperation and openness to the national and international scientific community, (2) consolidation of research in the areas characteristic of the study field, strengthening them, or expanding them along with the attraction of the tenured professors and young researchers, (3) strengthening cooperation with the enterprises of the industry in Latvia and abroad through Horizon Europe ECSEL, EUREKA, ERASMUS and COST programmes, (4) improvement of post-graduate study programmes supplementing and updating their curricula, incorporating the findings in the field and ensuring the transfer of scientific knowledge and research results in the study process to the degree possible, thus strengthening the research school, (5) strengthening research capacity by increasing the number of young researchers and PhD students working within the framework of industrial PhD studies". The publicly available English-language documentation provided by the faculties of RTU could not allow for verifying that claim; one may also mention the fact that the measures that are mentioned as to provide or increase international cooperation are not necessarily directly targeted at internationalization, but rather facilitate internationalization and cooperation.

1.4.4. The higher education institution has developed mechanisms for the involvement of the teaching staff in scientific research. They are sufficiently well-functioning and adequately efficient.
As presented in the Self-Assessment Report, "According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]".
The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean's management contracts. Academic staff is evaluated based [almost] on the same criteria.
Under that perspective, one can infer that the involvement of the academic staff in research is rather compelled to research rather than stimulated to research. The reported results show an increase in the number of publications, the number of citations, in the number of research funds attracted to the university. The academic staff has to acquire rights to supervise doctoral students from a committee that aims to increase the quality of supervision. The number of publications has decreased in 2020 and 2021 but remains at over 150 publications per year mark. The number of citations has also decreased since 2017.
The innovation (via patents) is not visibly encouraged (patents are apparently not measured in the same way as scientific papers) and the university apparently lacks a mechanism for evaluation of the patents that are registered and maintained under its owner name (as a proof, there are patents that have been terminated).

The presentation of the research results on the public website the university, in English, does not necessarily provide a live and encouraging image of the research ecosystem within RTU (there is no easy access to the listing of research results, papers, etc.). The presentation of the research results is also extremely variable according to faculties and study programs.

1.4.5. The higher education institution has developed mechanisms to promote the involvement of the students in scientific research and they are well-functioning and efficient for the doctoral and master studies, but just acceptable in bachelor studies. The students of the study programs of all levels are involved in scientific research. Doctoral grants are awarded to doctoral students which support scientific research output. Master students are involved in multi-disciplinary and inter-faculty research projects in cooperation with the industry. Vertically Integrated Project (VIP) brings together students from different fields and all study levels and enables them to collaborate on long-term research projects.
In a more detailed analysis, one notices that the research of the students gets diluted as one descends from doctoral studies toward bachelor studies.
The Self-Assessment Report mentions several directions of integrating research into teaching: involvement of students in research projects (including the realization of their graduation theses), enabling students to perform independent (or group) research work within the laboratories and facilities of RTU, involvement of guest lecturers (with high-research profile) in academic courses.
During the discussions with various groups of students enrolled within the study field, the students mentioned that it is rather difficult to join the research activities, since (according to various study programs) the research is not popularized (especially at the bachelor level) and even getting subjects for the dissertation is in some cases the job of the student.
At the level of doctoral study programs, the embedding of research into the curricula is consistent, as expected; at the level of the master study programs, there is also an important research component (although its extent is varying across the study programs and their type – academic or professional). At the level of bachelor programs, the involvement of students in research is rather rare and is not following a precise methodology.

1.4.6. Innovative solutions are applied in the study field, which has a significant positive impact on the study process. Design Factory, RTU IDEALAB, Product Development Project, Vertically Integrate Project, etc. are all positive examples of innovative solutions in the study field which have a positive effect on the study process. The staff (already 20 members) is also collaborating with the University of Buffalo and Massachusetts Institute of Technology to use that experience to further develop the study field.
The RTU includes the Faculty of E-Learning Technologies and Humanities (FETH), which, as one may expect and research reports document, is strongly involved in numerous projects aimed at delivering innovative pedagogical means that integrate technology at university-level teaching. Yet, as discussions with academic staff from various study programs showed, there is no consistent evaluation of the multimedia/ online content prepared for the disciplines and no specific guidance in implementing innovative teaching.

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

Conclusions
RTU is committed to establishing itself as an important research hub, on national, regional, and European levels. The teaching staff and researchers within RTU have good international cooperation. RTU has developed a strategic and procedural framework for the planning and realization of research that is inclusive with respect to the university’s academic community and outbound towards the industry. The research realized within the study field of “Information Technology,

Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" is well connected to all the international research themes. The RTU includes the Faculty of E-Learning Technologies and Humanities (FETH), which, as one may expect and research reports document, is strongly involved in numerous projects aimed at delivering innovative pedagogical means that integrate technology at university-level teaching. Yet, as discussions with academic staff from various study programs showed, there is no consistent evaluation of the multimedia/ online content prepared for the disciplines and no specific guidance in implementing innovative teaching.

Strengths:
1. The institution is committed to significant efforts toward research; management has set research performance-based KPIs from the faculty level down to the individual staff level.
2. Scientific research is conducted with input from students and staff.

Weaknesses:
1. The number of publications in recent years has decreased compared to earlier years which merits further analysis.
2. Poor visibility for the international public (English language) of the research results via institutional websites.
3. The transfer of research into the industry (via patents) and back to the study process needs improvements.
4. Limited transfer of research results obtained within RTU from the area of e-Learning Technologies into the RTU teaching process.

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

All criteria (1.4.1 to 1.4.6) are met based on the information provided by the HEI.

1.5. Cooperation and Internationalisation

Analysis

1.5.1. The cooperation partners are selected in view of the specific features of the study field and the relevant study programs. Cooperation within Latvia is established through various formal and officially required means. Cooperation to contribute to the implementation of the study programs in the study field include employers' and employers' organizations formally participating in the Study Field Committee, and Advisory Board of the faculties. For professional study programs, in some cases, RTU has established good cooperation in the development of a national framework of professional standards. Which, in turn, has led to improvements in the aims and the learning outcomes of relevant study programs. However, cooperation to improve the learning outcomes of the relevant study programs is not fully exploited. Especially in academic study programs such cooperation is less visible. For example, employers consistently indicated a lack of soft skills in the graduates. The "Industrial Doctor" program has been implemented since 2020. Two industrial Ph.D. studies have been implemented in cooperation with industrial partner Ltd LMT.
Cooperation to contribute to the achievement of the aims and learning outcomes of the relevant study programs include employers' providing internships, internship supervisors, and offering supervision and review of the thesis. Cooperation with industry partners has also facilitated new equipment for classrooms and laboratories.

Furthermore, RTU has established cooperation through participation or joint projects with multiple and relevant employers' organizations (LIKTA, LETERA), non-governmental organizations, and scientific institutes. RTU has established an Advisory Board of RTU, where the field of study is represented by relevant employers' representatives.
Graduate surveys and employers' surveys are conducted annually, but have low participation rates and are weakly structured. Thus, it is unclear whether these activities contribute to the aims and the implementation of the study programs.

1.5.2. International cooperation is in the strategic plan of the RTU and there is evidence of international cooperation activities in the form of projects (Horizon projects, Erasmus mobility, bilateral projects), mobility related to the study field as well as international professional organizations. It was stated that the range of cooperation partners is expanding. International cooperation with universities abroad has several aims (SAR): internationalization of scientific and teaching activities, supporting students' international experience, attracting international students and staff, and improving the study programs. These descriptions of the strategic role of internationalization in the SAR 2.5.2. are too general because concrete activities and goals are missing.
The cooperation partners are selected in view of the specific features of the study field and the relevant study programs.
Academic staff of the study field is active in cooperation with various non-governmental organizations (e.g. IEEE, ACM, ADHO).
Participation of students in international projects is limited to doctoral study programs (not all) and sporadically to graduate study programs.
The Erasmus project related to the interesting development of learning analytics tools was mentioned several times during the assessment visit and there is the belief that the engagement of students can be monitored and increased based on that.
Good examples of Erasmus mobility were given during the assessment visit. Erasmus mobility scheme is known but not exploited in full capacity, neither from students nor from teachers/professors.
But, in general, a clear relation between international cooperation and its contribution to the achievement of the aims and learning outcomes of the study field is not clearly presented in the SAR.

1.5.3. The RTU has developed a system and procedures for the attraction of the teaching staff and students from abroad within the study field. Even if students use mobility schemes, there is still a problem for students to go to mobility because they are not sure if their learning abroad will be fully recognized at home (students' statement during assessment visit - students' learning agreements are not prepared on time or courses enrolled abroad are not fully recognized at RTU). As a consequence students are reluctant to participate in international mobility, especially those that cannot afford to prolong their studies. It would be advisable to check the procedures for recognition of students' study period abroad and discuss with students how to make the procedures more transparent and efficient. However, the number of incoming Erasmus students is growing from 349 in 2016 to 873 in 2021, even taking into account COVID-19.
Strong international cooperation related to research and innovation in the study field can be noticed and statistical data (Annex: P25_2.5.3, P25_2.5.3, P25_2.5.3) shows an increase in incoming and outgoing mobility of students and teaching staff since the academic year 2013/2014 as well as the total number of foreign students in the study field (excluding mobility).
Outgoing mobility of teaching staff shows an increase in 2021/2022 with a total of 35 mobility, after the pandemic year 2020/2021. In 2018/2019 there was 16 outgoing mobility and in 2017/2018 there were 22 teachers in mobility; in 2016/2017 there were 13 mobilities; in 2015/2016 there was only 10

mobility (aggregated from data Annex: P27_2.5.3). In general, the most attractive host countries are European (Spain, Germany, Portugal, France, UK, and Norway).
Incoming mobility of teaching staff has stagnated and even decreased (pandemic years are not taken into consideration) with the highest pick in the academic year 2015/2016 (Annex: P27_2.5.3).
The RTU has developed a system for attracting teaching staff from abroad. At the same time attracting teaching staff for permanent positions from abroad is a challenge because of funding and salaries.
In general, teaching staff and students participate in both outgoing and incoming mobility, which could provide added value to the implementation of the study process and the quality of studies.
Internationalization at home has been exploited because students and teachers from abroad are present at RTU and cooperate with domicil students and staff. From what we learned during the assessment visit, students are not as extensively involved in international cooperation as staff.

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

Conclusions
Cooperation within Latvia is established through various formal and officially required means and the cooperation contributes to the implementation of the study programs.
International cooperation is in the strategic plan of the RTU and there is evidence of international cooperation activities in the form of projects and mobility. A stronger relationship between goals of internationalization, especially those related to aims and learning outcomes of study programs, and evidence of their fulfillment is missing.
Increase in outgoing mobility of teachers and students is evident. Teaching staff and students participate in both outgoing and incoming mobility, which could provide added value to the implementation of the study process and the quality of studies.

Strengths:
1. Well-established cooperation within Latvia with many relevant employers, employers' organizations, non-governmental organizations, and scientific institutes.
2. Cooperation with employers ensures internships, and internship supervisors, and offers supervision and review of the thesis.
3. Cooperation and internationalization are recognized as important in strategic documents. The RTU management and staff understand the role of internationalization and cooperation and they have their role in strategic planning.
4. The RTU uses available EU programs and initiatives.
5. The RTU cooperates with institutions from abroad (mainly higher education institutions/ colleges, and scientific institutes but also with professional international organizations) within the framework of the study field.
6. The RTU has developed a system and procedures for the attraction of students from abroad within the study field and the system is moderately effective.
7. Teaching staff and students participate in both outgoing and incoming mobility, which can provide added value to the implementation of the study process and the quality of studies.
8. The mobility of students and staff is supported by using the Erasmus+ scheme.

Weaknesses:
1. The description of the strategic role of internationalization in the SAR is too general.
2. Cooperation is not fully exploited to contribute to the achievement of the aims and learning outcomes of the study field and the relevant study programs.
3. Cooperation with industry is not fully exploited through graduate surveys and employers' surveys. They are conducted annually, but have a low participation rate and are weakly structured to provide

meaningful input to improve the content of the study programs.
4. There is still the problem of recognition of a student study period abroad because students' learning agreements are not prepared on time or courses enrolled abroad are not fully recognized at RTU.
5. Incoming mobility of teaching staff has stagnated.

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

All standards are fulfilled. The implemented cooperation mechanisms, although general, can deliver significant results in the aims of the study field

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

Analysis

1.6.1 The study field in its entirety and 20 individual study programs received recommendations during the 2013 accreditation process. Additionally, short- and long-term recommendations were received by the study programs (6) licensed during the reporting period. The latter is much more program-specific than the former.
11 recommendations pertaining to the entire study field. These recommendations focus on improving the quality of the aims of the study programs towards consolidating the academic offer; making the distinction between academic and professional programs visible; assigning teaching duties to the best available teacher for each course; intensifying collaboration with other Latvian and foreign HEIs; use English as the language of tuition at MSc level; establish opportunities for professional development of staff members. Of these, 3 recommendations have been implemented, 4 are being implemented, and 4 are continuously being implemented, as they pertain to whole processes rather than discrete action items.
However, some of the recommendations that have been formally implemented have not been sufficiently effective in resolving the underlying weakness and/or in completely removing its root causes. For example, when considering the recommendation “Necessary to develop a foreign language learning policy”, we assess that such a policy has indeed been implemented, but student complaints regarding insufficient proficiency in English of some members of academic staff still exist. Such complaints are usually addressed reactively rather than proactively, indicating that the foreign language policy is not working as intended - to prevent such cases from happening. Similarly, when the recommendation "Academic staff development policy is needed" is considered, we assess that the policy has indeed been formulated, but the resources necessary to implement it have not been allocated. For example, academic staff is provided with opportunities to increase their professional pedagogical development, but essentially they have to do that in their free time, as no paid time has been allocated for such activities. When considering the recommendation “Regular feedback from students, graduates and employers are required” we assess that surveys aiming at receiving feedback from graduates and employers have been implemented, but the questions in the questionnaires are general and the participation rate is very low to gain meaningful insight. What is more, there is no clear evidence that there is systematic working with the results from these surveys. The recommendation "Content overlap in study programs, reduction of the number of study programs'' has been addressed to some extent: three Doctoral study programs have been merged into one and several study programs have already been closed. However, content overlap among

programs remains an issue that somehow limits the ability to fully employ student-centered approaches or study field-specific approaches (for example, see 2.2.3 for Assessment of the study program Academic bachelor study program “Information Technology” for more details).
During the last accreditation process, each study program received 2-4 recommendations. Most of these focus on the need to receive and analyze regular feedback from students, employers, and graduates; the need to develop a policy for the development of regional branches; the need to place more targeted efforts on attracting foreign students; to improve collaboration with industry in certain programs; to increase hands-on activities in certain programs; to improve the teaching staff mobility and student exchanges. Many of these recommendations have been implemented, others are being implemented, and others are continuously being implemented, as in the case of recommendations to the entire study field. However, there are some recommendations that have been only “taken into account”, “considered”, or deferred to be implemented in the future. A similar landscape emerges when considering the implementation status of the recommendations received by the study programs licensed during the reporting period.

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

Conclusions
The RTU has considered the past recommendations and has taken concrete action towards implementing some of them; some past recommendations have not been implemented or have been formally implemented. Still, the University has laid out a track for addressing and solving quality assurance issues within a reasonable timeframe.

Strengths:
1. The University has seriously considered the past recommendations and has taken concrete action toward implementing them.
2. Even if not all past recommendations have been implemented, 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.
2. Some recommendations have been considered or deferred for future consideration/implementation.

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 RTU has seriously considered the past recommendations and has taken concrete action toward implementing them. Even if not all have been implemented, the University has laid out a track for doing so in a set time horizon. Some of the recommendations that have been formally implemented have not been sufficiently effective in resolving the underlying weakness and/or in completely removing its root causes.

1.7. Recommendations for the Study Field

Short-term recommendations

1. Plans for implementing those past recommendations that have only been considered or deferred for future consideration/implementation need to be formulated and applied.
2. One recommends that the University develops operational procedures and methodologies for the continuous evaluation of the quality and effectiveness of the e-learning material generated for the online teaching components of the study programs.
3. One recommends that the University develops operational procedures and methodologies for complete documentation of the interaction and cooperation with the stakeholders
4. One recommends that the University ensures fully transparent public information related to teaching staff workload and assignments
5. One recommends that the University ensures fully bilingual (Latvian/English) public information.
6. One recommends that the University insures better visibility for the international public (English language) of the research results via its institutional website
7. One recommends that the University implements a more uniform Self Assessment Report at the level of study programs.
8. Raising minimum standards for course materials available in Moodle.
9. Reconsider the approach to student surveys. Currently, they are heavily quantitative-based, where lack of responses sometimes is viewed as a reason not to act on identified problems. Consider a more qualitative approach, where issues that are raised by even a few students are considered and if necessary addressed as long as they make sense.
10. Consider making it mandatory for teachers to communicate feedback from student surveys and changes made, if any, to the next iteration of study courses' students. Make it mandatory to add a summary of survey responses and teachers' responses to the survey and changes made in Moodle.
11. One recommends that the University realizes the timely update on the number of employed graduates, such that one can follow the employment rate at 12 months after graduation.
12. One recommends that the University implements a mentoring/ tutoring mechanism for all the students (at least at the bachelor level) based on the implication of the teaching staff.
13. One recommends that a thorough analysis is performed regarding the simultaneous existence of study programs having exactly the same name but different types (academic/professional), different duration, or different levels (bachelor/ master).

Long-term recommendations

1. Revise the efficiency of the distribution of funding for the purchasing and modernization of equipment, given that a significant part of the facilities at the Faculty of Electronics and Telecommunications does not meet modern requirements.
2. One recommends that the University develops operational procedures and methodologies for the continuous training of the teaching staff in generating and delivering online teaching.

3. One recommends that the University develops operational procedures and methodologies such that changes in the composition of the teaching staff do not negatively affect the quality of the implementation of the study program and the compliance of the study program with the requirements specified in regulatory enactments
4. One recommends that the University implements a consistent plan for the student drop-out rate reduction.
5. Consider raising minimal pedagogical standards for teaching. Consider increasing support for teaching competencies. If possible, allocate paid time to such activities for teaching staff.
6. Modernize and upgrade the equipment at the Faculty of Electronics and Telecommunications in line with the current trends.
7. Revise existing methods of attracting foreign teaching staff and improve the effectiveness of attracting qualified foreign teaching staff.
8. Revise why the Centre of Academic Excellence's effectiveness does not ensure a uniform increase in skills in teaching methods among the teaching staff members and ensure that teaching staff has the opportunity to increase their expertise according to their individual needs.
9. Introduce clear and in-practice functioning measures on how the results and effectiveness of staff development are evaluated.

II - "Finance Management Information Systems" ASSESSMENT

II - "Finance Management Information Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. It is an inter-university joint study program, which is implemented together with the BA School of Business and Finance. Although the program is interdisciplinary by its character, the contents of the study program are to a great extent oriented to software engineering, information technology, computer science, and also computer engineering and computer control. It belongs to the study field due to a large extent (more than a half) of covering topics of ICT (Annex P09_3.2.1_DCP0(42484)_Plans_lv_Plan_eng.pdf)

2.1.2. The title of the study program – is Finance Management Information Systems.
The code of the study program – 42484 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `42` notes that this study program is professional bachelor program and the last three digits `484` indicate that this study program is related to the educational group of “programming”).
The degree to be acquired: Professional Bachelor Degree in Computer Systems.
Qualification to be obtained: Programming Engineer.
The 7 tasks (objectives) of the program correspond to the first part of the goal to educate and train software engineers for a professional career in software engineering with professional knowledge in programming languages, software development technologies, data structures and algorithms, software design project management, basic database technologies, computer system architecture and functioning, as well as competitive knowledge, skills, and competences in financial

management, but there are no tasks representing the financial part of the goal - educate and train competitive knowledge, skills, and competences in financial management.
The results of the study program (learning outcomes) are adequate (14 outcomes) for the professional bachelor's degree and comply with the aim and objectives of the study program. Learning outcomes include both knowledge, practical skills, and competencies in software development, as well as (unlike the tasks) knowledge and skills in finance management.
Admission requirements (General Secondary Education or 4-year Vocational Secondary Education) comply with the state regulations, where persons with secondary education can apply for the study program "Finance Management Information Systems". For English studies, a B2 level in English is required.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (2 implementation variants) –
● Full-time studies with a duration of 4 years (160 CP/240 ECTS) implemented in Latvian,
● Full-time studies with a duration of 4 years (160 CP/240 ECTS) implemented in English.
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. The program has been supplemented with the second language of its implementation – English. (SAR, p. 566). The volume of General Education Study Courses has increased from 12 CP to 13 CP, so the volume of field-specific professional study courses (B.1) has decreased from 14 CP to 13 CP. (SAR, p. 567). The changes made to the study programme are reasonable and don't negatively affect the quality of the study process.

2.1.4. As the study program was launched just in 2018, there were no graduates until the year 2022. (Annex P05_3.1.4_DCP0(42484)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf)
3 students graduated in 2022. (SAR, p. 572)
The professional Bachelor study program “Finance Management Information Systems” has taken over the best practices from the study program “Computer Systems”, and the latter is well recognized in the labor market. On the other hand, the study program “Finance” (of BASBF) as the basis of the financial part of this program, is recommended by 83 companies, e.g., KPMG Baltics JSC, Deloitte Latvia. (SAR, pp. 570, 571)
According to Annex P05_3.1.4_DCP0(42484)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, the annual number of admitted students is 6-11, making the total actual number of students in the program 6-31 (taking together students from both HEIs).
All students are self-paid (admitted in RTU).

2.1.5. Collaboration between RTU and BA School of Business and Finance (BASBF) on the matter of the joint program started in the year 2014 with expert discussions including also experts from the industry. (SAR, p. 575)
The presentation and discussion of the study program took place in 2017, later three independent experts took part in the evaluation process of the study program. (SAR, p. 576)
Higher education institutions developed a common quality assurance system. (SAR, p. 576)
Students are admitted to one or another HEI with uniform admission requirements. The common curriculum has been developed for all students, partly implemented by one or another HEI. Each higher education institution performs study quality measurements in accordance with its internal procedures. (SAR, pp. 576, 577)
The daily management of the study program is being ensured by the heads of the study program and the Program Council established by RTU and BASBF. (SAR, pp. 576, 577). The joint study programme is properly designed and implemented, and ensures a quality study process.

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are more specialization-focused and are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from high school.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the labor market.

Weaknesses:
No significant weaknesses.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 577-583) and the Annexes to it, and in the interviews conducted during the visit as well. The professional Bachelor program “Finance Management Information Systems” is simultaneously implemented by two Latvian higher education institutions: Riga Technical University and BASBF. Its aim is to educate and train software engineers for a professional career in software engineering with professional knowledge in programming languages, software development technologies, data structures and algorithms, software design project management, basic database technologies, computer system architecture and functioning, as well as competitive knowledge, skills, and competences in financial management. The program provides knowledge for obtaining the Qualification of Software Engineer and the internationally recognized SQA qualification in financial management and leads to a joint degree.
The motivation for starting the program has been the stated needs of the FinTech industry. The representatives of employers that the committee met with confirmed that the program appears to meet their needs. The need for enhanced soft skills among graduates has been noted by employers.
The program comprises field-specific theoretical basic and information technology-related courses (38 CP); field-specific professional study courses (48 CP); field-specific study courses (14 CP); practical placement (20 CP); and Bachelor Thesis (12 CP). General competencies are improved by general education courses (12 CP); humanities and social sciences courses (4 CP); languages (6 CP); and free elective courses (6 CP).
Some courses of the program have been modified since its initiation (in 2018) to reflect changes in the domain and to ensure complementarity and avoid duplication, as well as to better meet the needs of the industry. Nevertheless, the content of some of the programming courses is outdated (e.g. databases). The programming content is too much focused on web development, and modern topics (e.g. cloud computing, Business Intelligence) are missing. The Physics course appears to be not relevant to the program but is included in the curriculum so that compliance with the requirements of the engineering discipline is maintained. Appendix P8 provides information on the relationship between the title, aims, and tasks with the learning outcomes to be achieved. Therein it is unclear how the learning outcomes of the Physics course relate to those of the program. For example, the Physics course learning outcome “Able to independently solve the problems of classical physics -standard tasks” does not relate to the program learning outcomes - “Are able to select adequate algorithms, methods, software products, and tools in problem-solving” or “Are able

to think creatively to develop new methods".
Annex P07_3.2.1_DCP0(42484)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf provides information on the compliance of the program to the professional qualification requirements. The Annex states that according to the Latvian ICT association (LIKTA), the current version of the pertinent professional standard (approved in 2009 and available at https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0227.pdf) is outdated and does not reflect the actual needs of the industry. The study program has been evaluated based on a working version of the occupation standard developed by a working group organized by LIKTA and submitted for approval in March 2022. The approval of the standard is expected within 2022. However, if the new occupation standard is not approved, a risk of the program not being able to receive accreditation exists.
In case if the updated version for professional standard is not approved till the decision on accreditation is taken, it would be suggestable to provide programmes compliance with a professional standard in which is in forces and available in official registers (VISC homepage: https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0227.pdf

2.2.2. Not applicable

2.2.3. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 583-586) and the Annexes to it, and in the interviews conducted during the visit as well. At both RTU and BASBF, theoretical lectures, homework, study project presentations, practical classes, seminars, case studies, tests, and exams are used. Additionally, BASBF instructors organize study tours and study visits to financial institutions within the framework of financial courses.
The content is mostly made up by putting together existing subjects of other programs. The integration of the two distinct disciplines is being achieved by means of student projects on one hand and of common meetings of the teaching staff on the other. However, it is not always easy for students with an IT background/orientation to communicate with staff in economics/finances.
The study courses to be implemented by RTU and BASBF are determined taking into account the learning outcomes of the study program. The learning outcomes to be achieved by the study program and those to be achieved by the study courses are adjusted by the Program Council.
Once every semester, the students evaluate the work of academic staff members by completing an anonymous questionnaire. The heads of the study program of both higher education institutions discuss the results of the survey and, if necessary, propose changes in the content of the study courses and teaching methods at both higher education institutions. The results of the survey are also discussed at the meetings of the Program Council which is entitled to propose changes in the curriculum of the study courses and teaching methods at both higher education institutions. Additionally, the heads of the study program of both higher education institutions discuss the results of the survey with the respective academic staff members and propose changes to the study course curricula and teaching methods.

SAR pp. 584 mentions that "The teaching methods applied within the study courses, as well as the assessment methods are chosen by the instructors responsible for a respective study course according to the specifics of the
course curriculum and study program, as well as taking into account students' needs. The methods integrating the principles of student-centered teaching and learning that are used in the study program promote the achievement of the aims and learning outcomes of the study courses and the program as a whole." Yet, this statement is not sustained by any evidence (written, or derived from the discussions with teaching staff and students).

2.2.4. The analysis herein is based on the information provided in the Self Assessment Report (SAR)

pp. 586-589) and the Annexes to it, and in the interviews conducted during the visit as well. The internship (20 CP) is an integral part of the program. It is divided into two parts: Part I (10 CP) in the 3rd year of studies and Part II (10 CP) in the 4th year of studies. Depending on the institution at which the student is enrolled, either BASBF or RTU is responsible for organizing the internship. The student can choose their workplace as an internship place, upon previous agreement with BASBF or Riga Technical University.
The SAR provides a comprehensive overview of the internship, both in terms of processes and procedures, and content.
Before the internship, an introductory meeting is organized with the head of the study program at RTU or BASBF, depending on the institution at which the student is enrolled. During the meeting, students are acquainted with the internship documentation, internship organization procedure, and the public presentation of the internship achievements. During the internship, students communicate with an internship coordinator at the institution, as well as an internship supervisor at the company. The internship tasks include the duties of a software engineer and are closely related to the learning outcomes of the program.
The internship is organized in compliance with the pertinent regulations.

2.2.5. Not applicable

2.2.6. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 589-590) and the Annexes to it, and in the interviews conducted during the visit as well. As the program started in 2018, no students have yet graduated. The topic of the Bachelor Thesis is chosen in the autumn semester of the 4th year of studies. The list of topics related to financial management in the IT sector submitted by the 4th year students in the academic year 2021/2022 is relevant to the field.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The compliance of the program with the pertinent professional standard depends upon the approval of the draft standard. The opportunities and provision of the internship offered to the students, as well as the organization of the work, are effective. The tasks of the internship are related to the learning outcomes of the study program, and the internship complies with the requirements of regulatory enactments. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' final theses are relevant to the field and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
3. The topics of the Bachelor’s thesis are relevant to the program.

Weaknesses:

1. Full integration of the two distinct disciplines contributing to the program has not been achieved.
2. Courses bridging the knowledge gaps between the two disciplines are missing.
3. Some course content does not reflect the current trends in IT.
4. The learning outcomes of the Physics course do not relate to those of the program.
5. The soft skills of the graduates need further enhancement.
6. Student-centered teaching and learning approaches are not employed in full.
7. If the new professional standard is not approved, a risk of the program not being able to receive accreditation exists.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU and BASBF ensure all necessary provisions for the good implementation of the study program.
New RTU facilities at Zunda Embankment 10 and BASBF at Kr. Valdemāra Str. 161 and Skanstes Str. 43 are used by the program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). In addition, BASBF library and other resources are used.
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center. Students have access to the Bloomberg lab.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state (13 state-funded budget seats) and students fees. From 2018 to 2021 funding was between 31 712 and 55 252 Euros per academic year. In 2019/2020 it dropped to the lowest 22053 Eur, but in 2020-/2021 it was back up to 55 252. It is sufficient to support the young program, but not it is not sustainable in the long term. It is hard to predict how the program funding is going evolve just from 3 numbers. Hence, in 2-3 years financial performance of the program should be re-evaluated internally.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient. The SAR pp. 598-599 presents total funding for the program from both RTU and RBS of 32k, 22k and 55k euros in the last three years for a total of students of 6, 9, 23 (SAR pp. 572-573). The average number of students enrolled in the first year is 8.5 over the last 4 years, which is much lower than the minimal established by the RTU; this may pose problems in the long-term financing of the program, that may be insufficient.

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

Conclusions
The program is well supported by, both RTU and BASBF, there are no issues with infrastructure and other similar aspects. However, current funding is not sufficient in the long term. The program is still very young, hence at least 2-3 more years are necessary to see how it evolves, and then internally re-evaluate its financial performance.

Strengths:
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses:
1. Funding is insufficient in the long term, considering the small number of enrolled students.

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 provisions are sufficiently met to ensure the achievement of the learning outcomes, but in 2-3 funding of the program should be re-evaluated internally.

2.4. Teaching Staff

Analysis

2.4.1. Qualification of the teaching staff complies with the requirements for the implementation of the study program.
The total number of teaching staff is 40 (22 from RTU, 18 from BASBF).
The instructors involved in the implementation of the study program carry out research activities, participate in various international scientific and applied projects, publish scientific papers
RTU 19 (86.36%) lecturers have a doctoral degree. BASBF 8 (42.10%) lecturers have a doctoral degree, while 2 lecturers of the study program continue their studies in doctoral studies. RTU 20 (90.9%) and BASBF 13 (72.22%) - lecturers have a basic election place.

Industry experts are also invited to share their experiences on certain topics that supplement the study courses. Namely, the SAR 3.4.1. stated that there is academic staff involved in the implementation of the study program with a doctorate degree in accordance with the Law on Higher Education Institutions and the qualifications and work experience of teaching staff both in applied and scientific projects, as well as work experience in the industry (IT and Finance) help to achieve the study results of the program.
As reported in SAR 3.4.5. industry recommendations have been taken into account. Namely, based on the industry experts' recommendations, courses "Project Management", "Financial Markets and Investments" have been included, the study course "Applied Software" has been replaced with the study course "Applied Software Automation Tools", the study course "Technology of Large Databases" has been excluded and the study course "Data Models of Database Systems" has been included in the study program.

Regarding the English language skills of the teaching staff, the SAR does not specifically mentions the knowledge of English at B2 level at least; still, SAR pp. 607 mentions that "Study courses in English can be provided either by the responsible lecturer or by the lecturer who implements the study course. In case of non-compliance, the instructors will be offered to improve their knowledge of English at RTU courses, or other instructors with the required competence in a respective field and the appropriate level of English will be invited to participate in the implementation of the study program.". This signifies that RTU is aware of the necessity of proper English language skills for the teaching staff, but there is no clear mechanism to insure that knowledge. Still, attached resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

2.4.2. The higher education institution/college 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 and the compliance of the study program with the requirements specified in regulatory enactments.
There have been no significant changes in the composition of the academic staff.
In many cases, young colleagues start their careers at the Institute of Applied Computer Systems already during their studies by getting involved in research projects.
New specialists (also from industry) have been attracted as teachers to promote the introduction of the latest technologies.
At two departments there were changes in teaching staff - at the Department of Artificial Intelligence and Systems Engineering, and at the Department of Software Engineering.
Academic staff members regularly participate in various professional development activities.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report pp. 94, "According to the RTU requirements, apart from their involvementin the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]".
The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has
developed key performance indicators based on the research (such as the number of citations of the publications)
and the achievement of KPIs is part of the dean's management contracts. Academic staff is evaluated based [almost]
on the same criteria. As such, as mentioned in the Self-Assessment Report of the program (pp.

599-613),
from the last evaluation in 2013, the teaching staff contributed to peer-reviewed journal papers and a good number of conference papers.
The Self-Assessment Report of the program (pages 599-6138) does not mention any specific information about publications of the teaching staff, although the RTU shows an overall impressive list of publications (Annex 2.4.4_Projekti(Pētījumi)Jaunrade_LV_Projects(Research)Creation_ENG.zip and 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip) in which the search for achievements related to a specific study program are very hard to identify.

2.4.5. Mechanism for mutual cooperation of teachers involved in the implementation of the study program is in place and communication between teachers and teachers and industry is established. It is not clear how the alignment of study program goals and course learning outcomes has been established. Especially because there is a need for the cooperation of several departments in the design and delivery of the study program.

According to the SAR 3.4.5. regular instructors' meetings and methodological seminars are organized, where the exchange of experience on the topics of the study courses takes place, as well as the curricula of the study courses are developed and improved by mutually agreeing on the topics, areas, and responsibilities and complying with the regulatory requirements.
Formally, the number of students per academic staff in the study program is 0.86, but the number of students per industry specialist is 7.75. Such a calculation though could be misleading, as the study courses were combined with ones of other programs.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Experienced staff.
2. Teaching staff that has experience from the industry sector.
3. Cooperation with industrial partners in designing study courses.

Weaknesses:
1. Collaboration of teaching staff of both institutions is not clearly described, especially since it is not clear how the alignment of study program goals and courses' learning outcomes has been established
2. The English language skills level of the teaching staff is not explicitly evaluated or insured.

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 requirements are satisfied and no major shortcomings are identified. A minor concern is related to the way how the alignment of study program goals and courses' learning outcomes has been established.

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 P06_3.2.1_DCP0(42484)_AtbilstibaValstsStandartam_ProfBak_LV.pdf confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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 P07_3.2.1_DCP0(42484)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf confirms that the program is compliant with the Software Engineer professional standard, but the standard is not approved yet.
In addition, the professional standard approved on June 17, 2009 is currently in force and is available on the VISC website:
https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0227.pdf
In case the specified professional standard will not be adopted until the decision on the accreditation of the study field will be made, RTU must ensure that the study program meets the current professional standard.

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 (P10_DCP0(42484)_StudijuKursuapraksti_LV.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample P28_DCP0(42484)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognized documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

Annex P15_2.1.4_StudijuTurpin_StudyContinue.zip P15 2.1.4. RTU confirmation indicates that students have the opportunity to continue studies in the RTU study program “Computer Systems” (prof. bachelor) or in relevant study programs at Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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: Fully compliant

Annex P04_DCP0(42484)_Ligums un pielikumi.zip confirms that the study program is compliant with the requirements set forth by Law on Higher Education Institutions.

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

All criteria are satisfied, but Annex P07_3.2.1_DCP0(42484)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf confirms that the program is compliant with the new Software Engineer professional standard, which is not approved yet

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are more specialization-focused and are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from high school.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The compliance of the program with the pertinent professional standard depends upon the approval of the draft standard. The opportunities and

provision of the internship offered to the students, as well as the organization of the work, are effective. The tasks of the internship are related to the learning outcomes of the study program, and the internship complies with the requirements of regulatory enactments. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' final theses are relevant to the field and correspond to the study program.

The program is well supported by, both RTU and BASBF, there are no issues with infrastructure and other similar aspects. However, current funding is not sufficient in the long term. The program is still very young, hence at least 2-3 more years are necessary to see how it evolves, and then internally re-evaluate its financial performance.

The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments. Attached resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
2. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The topics of the Bachelor’s thesis are relevant to the program.
5. High demand for specialists in the labor market.
6. Experienced staff.
7. Teaching staff that has experience from the industry sector.
8. Cooperation with industrial partners in designing study courses.

Weaknesses
1. Funding is insufficient in the long term.
2. Full integration of the two distinct disciplines contributing to the program has not been achieved.
3. Courses bridging the knowledge gaps between the two disciplines are missing.
4. Some course content does not reflect the current trends in IT.
5. The learning outcomes of the Physics course do not relate to those of the program.
6. The graduates’ soft skills are insufficient.
7. Student-centered teaching and learning approaches are not employed in full.
8. If the new professional standard is not approved, a risk of the program not being able to receive accreditation exists.
9. Collaboration of teaching staff of both institutions is not clearly described, especially since it is not clear how the alignment of study program goals and courses’ learning outcomes has been established

Evaluation of the study programme "Finance Management Information Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Finance Management Information Systems"

Short-term recommendations

1. Improve integration of the two distinct disciplines contributing to the program.
2. Introduce courses bridging the knowledge gaps between the two disciplines.
3. Update course content to reflect the current trends in IT.
4. Modify the learning outcomes of the Physics course to relate to those of the program.
5. RTU needs to plan for mitigating the risk of the new occupation standard not being approved.
6. Explicitly evaluate and insure the English language skills level of the teaching staff.
7. In case if the project of professional standard is not approved until the decision on the accreditation of the study field is made, it is necessary to make a comparison with the professional standard which is in force.

Long-term recommendations

1. Add courses to more enhance soft skills to the graduates.
2. Modify courses to use student-centered teaching and learning approaches.
3. Define the collaboration of teaching staff of both institutions.
4. Increase funding for the program by increasing the number of enrolled students.

II - "Transport Electronics and Telematics" ASSESSMENT

II - "Transport Electronics and Telematics" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Professional bachelor study program “Transport Electronics and Telematics” is included in the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. The study program by its parameters, indicators, and content fully complies with the chosen study field.

2.1.2. The study program “Transport Electronics and Telematics'' is a professional bachelor study program with the goal to prepare specialists in the fields of transport telecommunications and transport radio electronics with the qualification “Electronics engineer”. The qualification corresponds to level 6 of the Latvian qualifications framework (LKI) and level 5 in the professional qualification framework (PKL).
The degree to be obtained is a Professional bachelor's degree in transport electronics and telematics. The classification code (IKK) is 42523. Following this code 484 corresponds to the “Electronics and automatics” subsection under the thematic field of “Engineering sciences and technologies” and 42 corresponds to professional bachelor higher education. The length and study

mode is full time 4 years and the structure of studies are in accordance with relevant standards of education - Cabinet Regulation No. 512 ‘Regulations on the second level of professional higher education state standards’. During the reporting period, only the Latvian language study mode is being implemented, but RTU is planning to offer the program in English as well. Documents are submitted only for full-time studies, while at the same time on the webpage (https://www.rtu.lv/lv/studijas/visas-studiju-programmas/atvert/ECT?department=13000&type=P) it is noted, that part-time extramural studies are also available. Admission requirements are a high school diploma or 4-year vocational education. The study program complies with general admission requirements by RTU. The study program goal is “to prepare specialists in the fields of transport telecommunications and transport radio electronics, who would be able to analyze the operation of wireless equipment and design telematics devices and systems according to requirements, as well as to prepare students for further academic or professional master's studies.” The study results are as follows:
- knows the basics of field-related fundamental sciences necessary for mastering theoretical study courses;
- is proficient at the concept level in wired and wireless transport telecommunications networks, key technologies, and standards;
- is proficient at the concept level in electrical circuits and signal processing;
- is proficient at the concept level in standards and technical regulations of the electronics industry;
- is proficient at the concept level in basics of operation and measurement methods, methods of telecommunication networks, and systems design and analysis;
- is proficient at the application level in transport electronics and telematics equipment principles of operation;
- is proficient at the application level in electronic components, analog, digital, and radio electronic devices;
- is proficient at the application level in the programming of microcontrollers and microprocessors by using high-level languages;
- is proficient at the application level in real-time transport radio and navigation systems;
- is proficient at the application level in transport intelligence and sensor systems;
- is able to perform experimental data processing for analysis of telecommunications and transport electronic systems operation;
- is able to systematize the related information, summarize, interpret and analyze results of measurements and calculations, prepare summarized reports and present them;
- is able to apply the latest technologies and software for the design of transport electronic systems and data transmission systems;
- is able to design electronic equipment and systems, simulate their operation, and develop applications and algorithms for solving specific tasks;
- is able to design printed circuit boards and the appropriate technical documentation;
- is able to work with scientific, technical, and methodological literature in a foreign language;
- can work individually and as a part of a team, to continue learning in the field of transport telecommunications and data transmission, to act in a sustainable, ethical and responsible manner not to harm society and environment.”

While it can be argued that defined outcomes are quite many, they are coherent. The study program both by its title, degree, qualification, and curriculum is consistent with the study field "Information technologies, computer engineering, electronics, telecommunications, computer management, and computer science". The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program.

2.1.3. During the reporting period some significant changes were made to the study program. As noted by RTU in SAR 3.1.1 the part-time and extramural implementation forms of studies were

excluded. Since 2017, all students of the part-time study program were transferred to a full-time study program, and admission to a part-time study program was discontinued, yet, as noted previously, the webpage has not been updated and old information remains regarding the part-time study program (although this is legal). There were other changes made, but it does not relate to basic indicators regarding the study program and are more in line with the study curriculum or administrative framework.

2.1.4. As of now there are 56 students in total studying in the program. On average about 20 students enrolled in the study program each year. It is worth noting that during the last enrollment numbers fell down to 12 students. RTU in SAR 3.1.4. notes that the fluctuations in the number of students are related to centralized examination results for school graduates (specifically, for STEM study courses), the socially-economic situation in a state (employment, migration), and field development trends in Latvia and abroad. Regarding employment indicators of the graduates of the study program - it must be highlighted that although general trends within the industry indicate good opportunities for employment, RTU failed to produce meaningful and actionable statistics regarding the employment of students graduating from this study program, therefore it is impossible to analyze these criteria.
2.1.5. Not applicable

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

Conclusions
The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field. It must be noted that RTU does not have data regarding the employment of graduates from this study program. RTU's webpage still features old information regarding the option to enroll in part-time studies.

Strengths:
1. Study program fulfills a valuable economic role in providing the industry with specialists within the field.

Weaknesses:
1. Information on the webpage regarding the study parameters is not up to date.
2. RTU does not collect relevant information regarding graduate employment.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. According to the SAR, the volume of compulsory study program courses is 135 ECTS. The mandatory study courses develop the knowledge and skills of the students and promote knowledge and skills in scientific research methods and their application. The compulsory elective (specialized) study courses 39 ECTS are intended to enable future specialists to obtain in-depth knowledge in their selected specialization field. The study program also includes humanities and social sciences study course 6 ECTS, language study courses 6 ECTS, and free elective study courses 9 ECTS. The student concludes the study program with an internship at a field-related enterprise (20 CP or 30 ECTS) and the development of a bachelor’s thesis work with a project part (12 CP or 18 ECTS).
The content of the study program is topical from a technological perspective since a significant number of study courses in this study program overlap with study courses from two other topical bachelor study programs "Smart Electronic Systems" and "Telecommunication Technologies and Data Transmission Engineering". Although this formally ensures that the study program contains

relevant content, it is unclear whether it fulfills its objective.

In meetings with students, graduates, and employers, the experts identified a lack of emphasis on the field of transport electronics, contrary to what is stated in the aim and title of the program. Therefore, increased attention was paid to those courses which, according to the self-assessment report, represent the field of transport electronics. As a result, a number of problematic facts were identified.

1) Study course “Transport Microprocessor Systems” (3 ECTS, TRT315) was analyzed. Contrary to the title of this course, there is practically nothing in its content that applies to transport microprocessor systems. The course essentially provides the fundamentals of microprocessors without the context of transport electronics. This can be verified very easily by looking at the first source of compulsory literature that is publicly available (https://ebooks.rtu.lv/product/transporta-mikroprocesoru-sistemas/). In this source, the word "transport" is used only in the introduction, conclusion, and page headers. The source itself describes in-depth and qualitatively the basic information related to the Intel 8085, Intel 8080, Intel 8051, and Intel 8086 microprocessors. The rest of the compulsory literature shares the same problem. The content of the course is not relevant to its title and purpose. It is misleading. In addition, the focus on the previously mentioned Intel microprocessors can be considered as an outdated approach, this technology has become irrelevant.

2) The study course “Transport Microprocessor Systems (study project)” (3 ECTS, TRT314) was analyzed. This study course has the whole set of problems as the study course ”Transport Microprocessor Systems” (TRT315). It is easily explainable since both courses are closely related.

3) The study course “Computer Modelling of Transport Electronic Systems" (4.5 ECTS, TRT305) was analyzed. Contrary to the title of this course, there is practically nothing in its content that applies to computer modeling of transport electronic systems. The course provides theoretical knowledge and develops practical skills in the development and analysis of electrical circuits by using specialized software without the context of transport electronics. This statement can be verified also by a review of obligatory literature included in the course description. It is focused on general-purpose circuit modeling without a specific context. The content of the course is not relevant to its title and purpose. It is misleading.

4) The study course “Transport Real-Time System E-Business” (4.5 ECTS, TRL329) was analyzed. The course content is devoted to the principles of e-commerce and mobile payment systems. This course can probably be considered relevant to the transport sector, but the title and description need to be improved as it is currently not clearly comprehended.

5) The study course “Data collection systems in intellectual vehicles” (4.5 ECTS, TRL341) was analyzed. The same problem here as faced before. The term "vehicle" only appears in the course title, not in the content. The study course is intended to gain knowledge about data collection system standards and data communication protocols, which will enable students not only to understand the principles of data collection systems but also to apply this knowledge to data acquisition system programming and configuration, considering technical capabilities and limitations by using the testbeds offered in the laboratory. In general, the course is focused on industrial and systematic data collection standards and devices. Those standards might be considered relevant for “intellectual vehicles”, but the link is not clearly visible. Also, the set of obligatory literature does not cover the field of transport electronics directly. The title of the study course can be considered misleading.

6) The study course “Transport Telecommunication Systems” (4.5 ECTS, TRT311) was analyzed. Although the content of this course could be described as relevant to the field, it is essentially a fundamental telecommunications course without the context of transport telecommunications systems. Of course, the technologies and principles considered in the course are relevant to transport telecommunication systems, but the title of the course is inappropriate and misleading.

It is important to note that there are courses of study relevant to the field of transport electronics (e.g. “Intelligent Transport Systems”, “Design of Transportation Systems in Real-Time”, “Communication in Intelligent Transportation Systems”, “Transport Electronic Control Systems”, and “Mobile Communication Systems in Transportation”). However, based on what was seen during the on-site visit and what was expressed by the students during the meeting, there is no evidence to suggest that the students gained sufficient practical experience in working with transport electronics systems during their studies.

2.2.2. Not applicable

2.2.3. There is a definite list of classical teaching methods that are well-developed and used on a daily basis to achieve the objectives and learning outcomes of the study program: lectures or practical classes, group work, or independent work. The RTU e-learning environment ORTUS, based on the Moodle platform, is used to support the learning process. Students can use all the resources available in the e-learning environment at their own pace and according to their individual needs.
The experts' visit found that student-centered methods are sometimes used, but unfortunately, most of the teaching staff did not give the impression that they would use such methods in their teaching practice. On the contrary, during the discussion, the impression was that many of the teachers were hearing about such methods for the first time. Moreover, no evidence of the use of such methods was available in the self-assessment report.
On the positive side, a learning-by-doing approach is actively used and supported during studies.

2.2.4. According to the curriculum plan, the internship is foreseen in the 4th year of study in the amount of 30 ECTS. The Internship is organized in compliance with the Senate decision on the Procedure of the organization of the Internship at RTU (Approved at the Meeting of RTU Senate on 28 January 2019 (Minutes No 626). The procedure of organization of the Internship at RTU stipulates the procedure for organizing and managing internships at Riga Technical University. The description of the procedure is a high-level document covering all professional study programs of RTU.
During meetings with employers, the experts were convinced that the students and the teaching staff of the study program have very close and regular connections with the industry. As a result, no factors were identified in both SAR or the expert’s visit that could create obstacles to finding and achieving a successful internship.
The study program is also implemented in the English language. According to SAR, the provision of internships for foreign students is organized in the same way as for local students. Additional support is provided for the Department of International Cooperation and Foreign Students, which participates in negotiations with students and potential internship providers by explaining formal requirements as necessary.
However, neither SAR nor the results of the expert’s visit provide any evidence of the provision of internship in English.

2.2.5. Not applicable

2.2.6. The SAR contains a list of all the topics of the bachelor theses during the evaluation period. They are all related to the field of study and the content of the program. Although, it should be noted that a minority of all topics are devoted to transport electronics.

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

Conclusions
The program is topical and its constituent courses are interconnected and complementary, with

some expected, and needed, overlap. Yet, the title of the study program is misleading. At least six field-specific courses (24 ECTS in total) include the terms “transport” or “vehicle” in the title, but the content of those courses does not cover transport systems specifics.

Strengths
1. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The learning-by-doing approach is actively used and supported during studies.

Weaknesses
1. The title of the study program is misleading. At least six field-specific courses (24 ECTS in total) include the terms “transport” or “vehicle” in the title, but the content of those courses does not cover transport systems specifics.
2. Student-centered teaching methods are used in the study process, however, the teaching staff is not sufficiently familiar with them at all, except for steam work and independent work.
3. The provision of internships for foreign students is organized in the same way as for local students, with limited support for the provision of internships in a foreign language.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the bachelor study program “Transport Electronics and Telematics”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
The study program is mainly sustained by laboratories located on the Faculty of Electronics and Telecommunications premises: the Laboratory of Transport's Network Performance Evaluation and Radio Navigation, the simulator classroom for communication systems and telecommunication networks, the Laboratory of the Internet of Things (IoT), the Electrical Measurements Student Laboratory, the Transmission Systems, and Access Networks Student Laboratory, the Digital Electronics and Computer Architecture Student Laboratory, the Transmission Media Student Laboratory, the Class of Communication Systems and Telecommunication Networks Mathematical Modelling.
The courses of the bachelor study program are provided mainly by the teaching staff of the Faculty of Electronics and Telecommunications, but other departments contribute as well, according to their

competencies (Engineering Mathematics academic Department, Optics Academic Department, The Academic Department of the Theory of Probability and Mathematical Statistics, Study department Labour and Civil Defence Academic Department, Environment Protection and Heat System Academic Department Electronic Hardware Academic Department, The Academic Department of Fundamentals of Electronics, Social Science Academic Department, Engineering Pedagogy and Psychology Academic Department, Special Application Language Department, Technical Translation Department).
It should be noted that the program involves the use of a special software and hardware infrastructure, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware and software platforms.
According to the SAR pp. 959, the bachelor study program “Transport Electronics and Telematics” has an equivalent allocation of some 33 state-funded seats per year, with an own budget of some 146k euros/year. This seems to be sufficient for sustaining the number of enrolled students.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. As presented in the Self-Assessment Report (pp. 959) and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the bachelor study program “Transport Electronics and Telematics” has an equivalent allocation of some 33 state-funded seats per year, with an own budget of some 146k euros/year (which does not include tax-paying students). Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability. The current program has on average some 25 students enrolled per year (on average over the last years, according to SAR pp. 939) and seems profitable.

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

Conclusions
The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the bachelor program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program's implementation. It should be noted that the program involves the use of a special software and hardware infrastructure, which is subject to technological aging and physical wear, and

as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware and software platforms.

Strengths:
1. Very good access to scientific databases and e-learning technologies.

Weaknesses:
1. The planning of the hardware replacement/ upgrade is apparently not performed and included in the financial planning.

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 provisions are sufficiently met to insure the achievements of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report and in the Annexes to SAR submitted for evaluation, the teaching staff of the bachelor study program “Transport Electronics and Telematics” consists of 40 persons, out of which 10 Professors, 6 Assoc. Professors, 14 docents, 8 lectors, 2 research assistants (SAR pp. 958 paragraph 2); at least 6 of the senior teaching staff hold a doctoral degree (in Physics or Engineering). The study program is implemented for less than 250 students. The teaching staff provisions are evaluated to conform to the requirements of the Higher Education Law of Latvia.
The SAR pp. 963 explains the modifications of the teaching staff from the previous evaluation, but there is no mention about provisions regarding the management of the changes in teaching staff.
There is a formal proof that English language skills of staff are sufficient, see “Apliecinājums - svešvaloduprasme.edoc” Nr. 02000-2.2.1-e/55 as a proof of English language skills matching at least B2 level.

2.4.2. As indirectly presented in the Self-Assessment Report (the teaching staff of the program at the previous evaluation is not mentioned), the teaching staff of the bachelor program “Transport Electronics and Telematics” has been changed significantly with respect to the previous evaluation (the average age of all teaching staff categories decreased, the total number of teaching staff increased from 29 to 45 (55%), as presented in Table 3, page 963 of the SAR). As observed in 2.4.1, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure; still, there is no available documentation regarding any specific provision on staff change at the University/ Faculty level.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (page 964) does not mention specific information about publications of all the teaching staff involved in the program (although these publications exist, as explained in the presentation of the key teaching personnel, presented on pages 960-962). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU, access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 40 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) towards the successful implementation of the study program.

Strengths:
1. The teaching staff involved in the program are relatively young (average age 44 years).

Weaknesses:
1. No sufficient proof of the cooperation between the teaching staff and their specific interactions towards program changes.
2. There are no documented provisions regarding the management of the changes in teaching staff.

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

There is full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06 (P06_3.2.1_ECT0(42523)_CompliancewiththeStateEducationStandard_ProfBak_ENG.pdf) confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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: Fully compliant

Annex P07 (P07_3.2.1_ECT0(42523)_ComplProfStand_ENG.pdf) confirms that the program is compliant with the Electronics Engineer professional standard

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: Partially compliant

The attached study course descriptions (A10_ECT0(42523)_StudyCoursesdescr_ENG.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in Law on Higher Education Institutions.
However, the title of the study program is misleading, or the content of the courses does not reflect it sufficiently. At least six field-specific courses (24 ECTS in total) include the terms “transport” or “vehicle” in the title, but the content of those courses does not cover transport systems specifics.

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 (P28_3.1.2_ECT0(42523)_DiplPielik_LV_DiplSupplemt_ENG.zip) complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - valsts valodas zināšanas.edoc”) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation . Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - svešvalodu prasme.edoc”) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU professional bachelor study program “Smart Electronic Systems”

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

RTU confirmation (Apliecinājums - par zaudējumu kompensāciju.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

Study program fully complies with regulatory enactments

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

The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field. The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the bachelor program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

Strengths
1. A learning-by-doing approach is actively used and supported during studies.

Weaknesses
1. The title of the study program is completely misleading because there is only one study course with a strong context of transport electronics.
2. Student-centered teaching methods are not used sufficiently to implement the study process, and most of the teaching staff are not familiar with them at all.
3. RTU does not have data regarding the employment of graduates from this study program.
4. Additional electronic equipment in a number of study courses, such as “Transport Microprocessor Systems” (TRT315), “Transport Microprocessor Systems (study project)” (TRT314), “Data collection systems in intellectual vehicles” (TRL341), “Computer Modelling of Transport Electronic Systems" (TRT305), “Transport Real-Time System E-Business”(TRL329), “Transport Telecommunication Systems” (TRT311) is required to improve them.
5. Students' drop-out rate needs additional attention and measures.

Evaluation of the study programme "Transport Electronics and Telematics"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Transport Electronics and Telematics"

Short-term recommendations

1. Increase the amount of content related to transport electronics in all courses of the program, or make changes to the title and objectives of the program in a way that does not give a misleading impression of the content of the program.
2. Revise the content of the study courses “Transport Microprocessor Systems” (TRT315) and “Transport Microprocessor Systems (study project)” (TRT314) to make them relevant to the titles and directly related to microprocessor systems used in transport electronics.
3. Revise the content of the study courses “Data collection systems in intellectual vehicles” (TRL341), “Computer Modelling of Transport Electronic Systems" (TRT305), “Transport Real-Time System E-Business”(TRL329), “Transport Telecommunication Systems” (TRT311) to make them relevant to the titles and directly related to transport-electronics.
4. Consider the introduction of transport-electronics-related equipment for the implementation of study courses “Transport Microprocessor Systems” (TRT315), “Transport Microprocessor Systems (study project)” (TRT314), “Data collection systems in intellectual vehicles” (TRL341), “Computer Modelling of Transport Electronic Systems" (TRT305), “Transport Real-Time System E-Business”(TRL329), “Transport Telecommunication Systems” (TRT311).
5. Consider implementing a consistent plan for the reduction of the student drop-out rate.
6. Update the program’s website.
7. Extended support for foreign students by providing more information and communication possibilities in English, e.g. by providing internship information and possibilities in English.

Long-term recommendations

1. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
2. Consider the documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
3. Consider the implementation of a mentoring/ tutoring mechanism for all the students based on the implication of the teaching staff.
4. Consider the planning of the hardware/software replacement/ upgrade and include the cost estimates in some financial planning.
5. Introduce more student-centered teaching methods into the study process.

II - "Smart Electronic Systems" ASSESSMENT

II - "Smart Electronic Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Professional bachelor study program “Smart Electronic Systems” is included in the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. The study program by its parameters, indicators, and content fully complies with the chosen study field.

2.1.2. The study program “Smart Electronic Systems '' is a professional bachelor study program with the goal to prepare specialists in the fields with the qualification “Electronics Engineer”. The qualification corresponds to level 6 of the Latvian qualifications framework (LKI) and level 5 in the professional qualification framework (PKL). The degree to be obtained is a Professional bachelor's degree in electrical science. The classification code (IKK) is 42523. Following this code 484 corresponds to the “Electronics and automatics” subsection under the thematic field of “Engineering sciences and technologies” and 42 corresponds to professional bachelor higher education.
The length and study mode is full time 4 years (160 CP) and the structure of studies are in accordance with relevant standards of education - Cabinet Regulation No. 512 ‘Regulations on the second level of professional higher education state standards’. During the reporting period studies are conducted in Latvian and English. Admission requirements are a high school diploma. For international students, admission requirements are a secondary school diploma, an IELTS minimum overall grade of 5.5 or other similar certification, a video interview, and an online entrance examination in Mathematics.
The study program goal is “to train specialists of internationally recognized level with a professional master’s degree trained to perform design and technical operation works for transport electronics and telematics systems in the following fields: transport radio systems, transport telecommunications, transport computer systems and networks, aviation communication systems, railway transport communication, and information systems. To teach professionals skills of analytical thinking, modeling, developing, implementing, and managing new engineering solutions. In addition, to develop the ability of the students to conduct research and experimental work, participate in local and international projects, and continue their doctoral studies.” The study results are as follows:
“Graduates of the study program can manage transport computer networks, understand their internal processes;
- can design, develop, and operate electronic equipment and telematics systems. Perform its testing, analysis, operation modeling, and improvements in accordance with the requirements of the standards and develop the appropriate technical documentation;
- can utilize the latest technologies and software for the design and production processes of electronic equipment and systems;
- can participate in research projects and provide assistance in pedagogical work;
- can evaluate human resources and create a project working group, delegate work tasks and control their execution, and present the progress and results of the project;
- is proficient at the concept level in the latest telematics and electronic equipment manufacturing technologies, industry standards, and technical norms;
- is proficient at the application level in signal processing, telecommunications theory, data coding and protection (cryptography), and training neural networks;
- is proficient at the application level in the construction and design of telematics equipment, transport intelligent data transmission systems, and sensor networks;
- is proficient at the application level in programming microcontrollers and microprocessors by using high-level languages.”
The study program both by its title, degree, qualification, and curriculum is consistent with the study field "Information technologies, computer engineering, electronics, telecommunications, computer

management, and computer science". The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program.

2.1.3. As the study program is relatively new (licensed in 2020) and was developed to replace the academic bachelor study program “Electronics and mobile communications”, there were no significant changes during the reporting period to study program parameters and indicators. Some changes were made to the curriculum. All changes are justified and supported.

2.1.4. The economic justification of the program is very clear and driven from the industry; as SAR pp. 1019 mentions, "The application of electronic devices is rapidly increasing in all industries. Therefore, there is a high demand for experts with good knowledge in basic STEM (Science, Technology, Engineering and Mathematics) study courses and the basis of the electronics industry (circuits, signals, electronic devices, electrodynamics, etc.), who already possess the working experience and specialisation in particular areas. This can only be provided by professional study programmes presenting an opportunity to specialise in a specific area and undergo practical placement."
As of now there are 143 students in total studying in the program. There are also 37 foreign students. On average 65-102 students enroll in study programs each year. The overall dynamics of the student body are good. RTU reports in SAR 3.1.3. that employment of the graduates of the study program is provided by the companies of the Latvian Information and Communication Technology industry (ICT), for example: AS “SAF Tehnika”, SIA “Mikrotīkls”, VAS “Latvijas Valsts Radio un Televīzijas Centrs”, SIA “Lattelekom”, SIA “TET", SIA ”Latvijas Mobilais Telefons", SIA “Tele2”, VAS “Elektroniskie sakari”, AS “Alfa”, AS “HansaMatrix”, SIA “HansaMatrix Innovation", Accenture Latvijas filiāle, SIA “UAVFactory”, SIA “Citrus Solutions”, AS “Draugiem Group”, SIA “Intelligent Systems”, SIA “AERONES", SIA “Vizulo”, SIA “Regula Baltija”, SIA “Baltic Scientific Instruments" etc. Yet, in-depth statistics are lacking regarding the employment of graduates.

2.1.5. Not applicable

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

Conclusions
The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field.

Strengths:
1. Study program fulfills a valuable economic role in providing the industry with specialists within the field.
2. The number of students is at relatively good levels.

Weaknesses:
none

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The professional bachelor study program “Smart electronic systems” is implemented as a 160 CP 4-year study program with a specialization in compulsory elective study courses in the 3rd and 4th years. Bachelor studies are 4 years divided into 8 study semesters, during which compulsory (84 CP), compulsory elective (38 CP), and free elective (6 CP) study courses, the practical placement (20

CP) need to be completed. The Bachelor Thesis with a design part (12 CP) has to be developed.
The professional field-specific study courses included in the study program are additionally merged into specialization modules: smart embedded systems, signal processing, and wireless communication systems, analog and RF equipment and systems, and electronic hardware design (horizontal specialization), thus providing integrity to the study program. The inclusion of the study courses comprising modules in the part of compulsory study courses allows students to gain basic knowledge in several fields of smart electronic systems in the 1st and 2nd study years.
The content of the bachelor study program “Smart electronic systems” complies with the standard of profession of the Electronics Engineer. Therefore, both formally and in fact, the content of the study program is topical and corresponds to specific industry needs.

However, during the meeting with employers, several drawbacks regarding the content were identified.
Employers expressed concern about the low level of programming skills among graduates. A review of the content of the study program shows that only one course, The C Programming Language (3 ECTS), is devoted to the gaining of programming skills. It should be mentioned that there are also several interdisciplinary courses contributing to the development of programming skills, such as Computerisation of Mathematical Tasks in Electrical Engineering, Embedded Systems Architecture and Peripherals, Embedded Systems Architecture and Peripherals (Study Project) and Computer Studies (Basic Course). An additional aspect is that the corresponding professional standard does not explicitly require high-level programming skills, although every modern electronics engineer should have sufficient programming skills. In conclusion, this analysis shows that the study program director and the study program council need to 1) analyze whether the programming skills gained during the studies are relevant to current industry needs; 2) introduce changes in the study content if provided skills do not meet the requirements of the industry.
Employers pointed to the need to improve the teamwork and presentation skills of graduates. Such skills are required by applied professional standards as well. The study program includes a 9 ECTS study course - “Innovative Product Development and Entrepreneurship”, which, according to its description, provides the acquisition of the skills required above. In conclusion, this analysis shows that the study program director and the study program council need to 1) analyze whether the teamwork and presentation skills gained during the studies are relevant to current industry needs; 2) introduce changes in the study content or specific course content if provided skills do not meet the requirements of the industry. Although, the number of ECTS dedicated to gaining soft skills is sufficient. Therefore, the efficiency of soft-skill study courses should be analyzed and potentially increased.

2.2.2. Not applicable

2.2.3. There is a certain list of classical teaching methods well established and used on a daily basis to achieve the aims and learning outcomes of the study program: lectures or practical classes, group work, or independent work (both at home or in the facilities of RTU). The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.

The experts' visit (various discussions with students and teaching staff) found that student-centered methods are sometimes used, but unfortunately, most of the teaching staff did not give the impression that they would use such methods in their teaching practice. On the contrary, during the discussion, the impression was that many of the teachers were hearing about such methods for the first time. Moreover, no evidence of the use of such methods was available in the self-assessment

report (SAR pp. 1031 mentions “Courses and workshops on modern teaching and study methods are organized for the academic staff”, but no further specific information is provided).
On the positive side, a learning-by-doing approach is actively used and supported during studies. During the visit, the experts identified a number of positive examples where students are allowed to take equipment to their homes in a systematic way. This approach allows students to work according to their individual working pace and master in-depth skills, like programming embedded systems on an HDL basis, signal processing, etc. For these purposes, the study program materials, particularly the technical equipment, are regularly supplemented by adding unique portable sets of kits and development tools.

2.2.4. According to the curriculum plan, the internship is foreseen in the 4th year of study in the amount of 30 ECTS. The Internship is organized in compliance with the Senate decision on the Procedure of the organization of the Internship at RTU (Approved at the Meeting of RTU Senate on 28 January 2019 (Minutes No 626). The procedure of organization of the Internship at RTU stipulates the procedure for organizing and managing internships at Riga Technical University. The description of the procedure is a high-level document covering all professional study programs of RTU. According to the SAR, the Latvian Electrical Engineering and Electronics Industry Association (LETERA), with approximately 95 active members registered as of the beginning of 2022 - large and small companies of the industry, also provides important support for internship placements. During meetings with employers, the experts were convinced that the students and the teaching staff of the study program have very close and regular connections with the industry. As a result, no factors were identified in both SAR or the expert’s visit that could create obstacles to finding and achieving a successful internship.
The study program is also implemented in the English language. According to SAR, the provision of internships for foreign students is organized in the same way as for local students. Additional support is provided for the Department of International Cooperation and Foreign Students, which participates in negotiations with students and potential internship providers by explaining formal requirements as necessary.
However, neither SAR nor the results of the expert’s visit provide any evidence of the provision of internship in English.

2.2.5. Not applicable

2.2.6. The first students were enrolled in the professional Bachelor study program “Smart electronic systems” in 2021. Therefore, there are no program graduates at the moment preparing for the SAR. The study program “Smart electronic systems” was developed based on the academic Bachelor study program “Electronics and mobile communications", therefore the graduation papers of this program are analyzed.
The SAR contains a list of all the topics of the bachelor theses during the evaluation period. They are all related to the field of study and the content of the program.
According to the SAR, from 2013 to 2021, most students in the 3rd year were employed in companies and selected the topic of the graduation paper, its development methods, and tools in compliance with their work specifics. Therefore, it can be said that the topics of graduation papers reflect the industry development trends, and their division conforms with the priority directions selected by the companies. The experts' visit confirmed the above-mentioned fact that the topics of students' bachelor theses are closely tied to industry.

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

Conclusions

The content of the study program and its implementation are appropriate and “as expected” for a bachelor-level engineering program. The teaching methodology does not seem to have evolved from the standard magistral teaching. Study courses could have more content on developing programming skills.

Strengths:
1. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The learning-by-doing approach is actively used and supported during studies.
3. A strong connection between the content of the study program and the needs of the industry is established.
4. Students are supported by take-away development boards for a certain list of study courses.
5. Possibility to choose between modules during your studies, allowing students to develop in a direction that interests them.
6. Project-oriented teaching methods are used for several courses.

Weaknesses:
1. Student-centered teaching methods are not used sufficiently to implement the study process, and most of the teaching staff are not familiar with them at all.
2. The provision of internships for foreign students is organized in the same way as for local students with limited support for the provision of internships in a foreign language.
4. Study courses could have more content on developing programming skills.
5. General skills study courses seem to have low effectiveness.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the bachelor study program “Smart Electronic Systems”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). For the provision of the study program, there is a minimum of 108 books in Latvian and minimum of 626 books in English available in the RTU library. Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
The study program is mainly sustained by some specialized laboratories and centers: the Institute of Radioelectronics; Departments of basic electronics; Department of electronic devices; Department of radio devices; Institute of Telecommunications; Department of transmission systems; Department of telecommunication networks; Department of telematics and transport electronic systems.

In addition to the basic study laboratories, students can also use the specialized laboratories located on the ETF premises: Wireless sensor network and software-defined radio laboratory; Laboratory of Electroacoustics; Prototyping laboratory; Siemens IoT laboratory; Electronic devices testing center of Latvia (LEITC); Electronics club.
The courses of the bachelor study program are provided mainly by the teaching staff of the Faculty of Electronics and Telecommunications, but other departments contribute as well, according to their competencies (Department of labor and civil defense; Department of engineering mathematics; Department of the probability theory and mathematical statistics; Department of optics; Department of the artificial intelligence and system engineering; Department of computer networks and system technology; Department of social sciences; Department of languages of special use.).
According to the SAR pp. 882, the bachelor study program “Smart Electronic Systems” has an equivalent allocation of some 70 state-funded seats per year, with an own budget of some 330k euros/year. This seems to be sufficient for sustaining the number of enrolled students and ensuring the resilient development of the program.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period. Still, it should be noted that the program involves the use of special hardware, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to ensure the continuous upgrade of the hardware platforms.

2.3.2. Not applicable

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the bachelor study program “Smart Electronic Systems” has an equivalent allocation of some 70 state-funded seats per year, with an own budget of some 330k euros/year (which includes tax-paying students). Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs”, according to which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability. The current program has on average over 60 students enrolled in the first year (on average over the last 4 years, according to SAR pp. 1022). This ensures a very profitable program.

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) to implement the program efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program's implementation and

development. It should be noted that the program involves the use of special hardware, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to ensure the continuous upgrade of the hardware platforms.

Strengths:
1. Very good access to scientific databases and e-learning technologies.
2. Very good industrial cooperation.

Weaknesses:
1. The planning of the hardware replacement/ upgrade is apparently not performed and included in the financial planning.

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 provisions are sufficiently met to insure the achievements of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report and in the Annexes to SAR submitted for evaluation, the teaching staff of the bachelor study program “Smart Electronic Systems” consists of 44 persons, out of which 7 Professors, 9 Assoc. Professors, 11 Assistant Professors - all but 2 assistant professors holding a doctoral degree (in Physics or Engineering). The remaining 19 teaching staff don't have a scientific degree but possess sufficient practical work experience compliance with the relevant study course. Lecturers and assistants who do not have scientific and academic degrees have practical work experience in electronics manufacturing companies amounting to five or even more years. The study program is implemented for less than 250 students. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

2.4.2. As presented in the Self-Assessment Report, the teaching staff of the bachelor program “Smart Electronic Systems” has been changed at a ratio of 25% with respect to the previous evaluation. As presented in SAR pp. 1057, the mean age of the teaching staff decreased from 64 to 49. As observed in criterion 2.4.1, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure; still, there is no available documentation regarding any specific provision on staff change at the University/ Faculty level.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management

of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the study (such as the number of citations of the publications) and the achievement of KPIs is part of the dean's management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (pages 1057-1058) does not mention any information about publications of the teaching staff (although these publications exist). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation exists between all stakeholders involved in the study program, which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU - email, chat, and video conferencing tools, access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear and documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 44 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) toward successfully implementing the study program.

Strengths:
1. The teaching staff shows good research results and an important involvement in research projects.

Weaknesses:
1. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
2. There are no documented provisions regarding managing the changes in teaching staff.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06 (P06_3.2.1_DBF0(43526)_AtbilstibaValstsStandartam_AkadBak_LV 1.docx) confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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: Fully compliant

Annex P07 (“P07_3.2.1_ECV0(42523)_AtbilstībaProfStand_ProfBak_EN.pdf”) confirms that the program is compliant with the Electronics Engineer professional standard

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 (“Bak_studiju kursi_ENG.zip”) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (“P28_3.1.2_ECV0(42523)_DiplPielik_LV_DiplSupplemt_ENG.zip”) complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - valsts valodas zināšanas.edoc”) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation . Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - svešvalodu prasme.edoc”) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic bachelor study program “Telecommunication Technologies and Data Transmission Engineering”.

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

RTU confirmation (Apliecinājums - par zaudējumu kompensāciju.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

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

Study program fully complies with regulatory enactments.

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

The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field. The university has allocated all needed provisions (scientific, informative, material, technical and financial) to implement the study program efficiently and correctly. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. The study program fully complies with the regulatory enactments.

Strengths:
1. Study program fulfills a valuable economic role in providing the industry with specialists within the field.
2. The number of students is at relatively good levels.

Weaknesses:
1. The graduates' programming skills do not meet the industry's requirements.
2. Student-centered teaching methods are not used sufficiently to implement the study process, and most of the teaching staff are not familiar with them.

Evaluation of the study programme "Smart Electronic Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Smart Electronic Systems"

Short-term recommendations

1. Analyze whether the programming skills gained during the studies are relevant and sufficient to current industry needs, and introduce changes in the study content if provided skills do not meet the requirements of the industry.
2. Analyze whether the teamwork and presentation skills gained during the studies are relevant and sufficient to current industry needs and introduce changes in the whole study program content or specific course content if provided skills do not meet the requirements of the industry.

3. Revise the efficiency of the study course “Innovative Product Development and Entrepreneurship” for the teaching of general skills such as teamwork skills, presentation skills, communication skills, etc., and revise the used teaching methods and approach if some gaps are identified.
4. Consider the planning of the hardware replacement/ upgrade and its associated financial planning.
5. Consider the documentation of the cooperation between the teaching staff towards program changes and the managing of the changes in teaching staff.

Long-term recommendations

1. Consider the development of Student-centered teaching methods.
2. Consider the provision of internships for foreign students organized with more foreign language support.

II - "Computer Systems" ASSESSMENT

II - "Computer Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The contents of the study program are oriented to software engineering, information technology, computer science, and also computer engineering and computer control. (SAR, p. 661) Most of the courses of the program (Annex P09_3.2.1_DCD0(42526)_Plans_lv_Plan_eng.pdf) cover topics of ICT. The contents are very close to the corresponding academic bachelor study program, differing mostly in an internship.

2.1.2. Interrelation of parameters of the study program.
The title of the study program is Computer Systems.
The code of the study program – 42526 which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `42` notes that this study program is professional bachelor program and the last three digits `526` indicate that this study programme is related to the educational group of “other engineering sciences”.
The degree to be acquired: Professional Bachelor Degree in Computer Systems.
Qualification to be obtained: Programming Engineer.
The 13 tasks (objectives) of the program correspond to the goal to prepare high-qualification professionals, i.e., programming engineers (in compliance with the fifth level of qualification of the professional standard of a programming engineer) to perform professional activities in the field of software engineering having a professional knowledge in programming languages, technologies of software development, data structures and algorithms, software development projects management, basic technologies of databases, computer systems architecture and functionality, as well as to participate in a software development project (team), performing different tasks and following IT industry standards and professional ethics.
The results of the study programme (learning outcomes) are adequate (10 outcomes) for the

professional bachelor's degree and comply with the aim and objectives of the study programme. Learning outcomes include both theoretical knowledge and practical skills and competencies in software development, as well as the ability to analyze and communicate things.
Admission requirements (general or vocational secondary education or first-level professional higher education in computer systems) comply with the state regulations, where persons with secondary education can apply for the study program "Computer Systems", as well as adding the opportunity of being enrolled with the previously obtained first-level professional higher education in computer systems with recognizing the credit points obtained from it, so the study duration is only 3 semesters.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (2 implementation variants) –
● Full-time studies with a duration of 4 years (160 CP/240 ECTS) implemented in the Latvian language,
● Full-time studies with a duration of 4 years (160 CP/240 ECTS) implemented in the English language.
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. Classification code was changed to 42526 (in accordance with Latvian Republic Cabinet Regulations No. 322 of 13 June 2017). (SAR, p. 659)
The volume of the program was changed from 161 CP in 2013 to 160 CP in 2022 (in accordance with Latvian Republic Cabinet Regulation No. 512 adopted on 26 August 2014 “Regulation on the State Standard of the Professional Higher Education of the Second Level”). (SAR, p. 659)
General education study courses in engineering such as “Engineering chemistry” and “Electrical engineering and electronics” have been excluded from the program, devoting more attention to the development of specific field-related skills in study courses. (SAR, p. 660)
The study program has been supplemented with the second language of its implementation – English. (SAR, p. 660). The changes seem reasonable and can be supported by the expert team.

2.1.4. Graduates of engineering and IT sciences are in wide demand in the labor market, as can be seen from the advertisements. (SAR, pp. 662, 663)
Graduates of the study program “Computer Systems” can start a professional career in ICT companies by performing a variety of roles. (SAR, p. 663)
Graduates are mostly working in their major, working in higher qualification professions already one year after graduation, and earning salaries that are well above the national average. (SAR, p. 663)
The study program is highly rated in prakse.lv surveys. (SAR, p. 663)
According to Annex P05_3.1.4_DCD0(42526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, in recent years, the annual number of admitted students is 6-25 (into the 2nd year), making the total actual number of students in the study program 20-40, whilst the annual number of graduates is 0-12, in all cases with the tendency to decrease in the last years.
All students are state-funded.

2.1.5. Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are fully in line with the goals of this qualification. Admission to studies is made

according to external and internal requirements after graduating from high school as well as benefiting from having acquired first-level professional higher education.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.

Weaknesses:
1. Significant overlap with the academic bachelor study program having the same name.
2. Decrease in the number of students graduates (1 graduate in the study year 2019/2020, 0 graduates in 2020/2021) while the corresponding academic program has 60-80 graduates each year.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 664-667) and the Annexes to it, and in the interviews conducted during the visit as well. The SAR provides a good overview of the structure and content of the study program.
The compulsory part of the study program includes courses (102 CP), which are divided into three subsections. Part A1 of the study program includes general education courses for mastering compulsory parts of the professional bachelor study program – a module of entrepreneurship professional competence, environmental protection, civil defense, and occupational safety courses, as well as general education IT field basic courses. The total volume of part A1 is 12 CP.
Part A2 of the program (36 CP) includes the compulsory field-specific theoretical foundation courses, including higher mathematics, physics, solution algorithmization and programming, analysis of data structures and systems, special sections of artificial intelligence, and basics of sector rights.
Part A3 of the program (54 CP) includes professional specialization courses in the fields of algorithmization, programming languages and approaches, databases, computer networks, computer architecture, software development technology, the internet of things, testing, and system analysis.
In the non-compulsory part, part B1 (6 CP) allows the students to select specialized study courses relevant to their interests, and part B2 (humanities and social study courses, 4 CP) develops the students' basic social, communicative, and organizational skills. Free elective courses (6 CP) allow students to select the study content appropriate for their professional interests and needs. The need for enhanced soft skills among graduates has been noted by employers.
As the study program has a professional inclination, a minimum of 50% of classes in professional courses are practical and laboratory works; for some courses, the volume of practical and laboratory works reaches up to 75%. Moreover, during the lectures, the academic staff devote special attention to the usage of technologies for solving real tasks, thus ensuring that a programming engineer masters the required knowledge and skills as much as possible.
The courses are regularly updated, as is also the curriculum, so as to ensure the provision of relevant content, in line with the needs of the labor market and the trends in the IT field. Examples of changes are given in the SAR (p. 665).
Annex P06 (P06_3.2.1_DCD0(42526)_AtbilstibaValstsStandartam_ProfBak_LV.pdf) of the study program self-evaluation report provides a comprehensive mapping of the requirements for compliance of the study program with the state education standard Cabinet Regulations No. 240 of 13 May 2014 "Regulations on national academic education standards" https://likumi.lv/doc.php?id=266187 (In Latvian).

Annex P07 to the SAR states that according to the Latvian ICT association (LIKTA), the current version of the pertinent professional standard (approved in 2009 and available at https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0227.pdf) is outdated and does not reflect the actual needs of the industry. The study program has been evaluated based on a working version of the occupation standard developed by a working group organized by LIKTA and submitted for approval in March 2022. The approval of the standard is expected within 2022. However, if the new occupation standard is not approved, a risk of the program not being able to receive accreditation exists.

2.2.2. Not applicable

2.2.3. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 667-671) and the Annexes to it, and in the interviews conducted during the visit as well. Lectures, practical classes, laboratory and independent work implemented individually and in groups, tests, and a graduation paper are employed as teaching methods, at the discretion of the instructors. The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.
The students are offered a wide variety of learning materials (documents, presentations, video recordings, interactive learning materials, etc.). They have the right to propose their own topic for the graduation paper, thus achieving learning outcomes in an area that interests them. Additionally, they have the opportunity to receive individual tutorials from the academic staff involved in the study program. Further, a wide range of extra-curricular activities is offered to the students.
Annex P08 (P08_3.2.1_DCD0(42526)_Kartejums_lv_Mapping_eng.pdf) of the SAR provides a comprehensive mapping of the courses against the program learning outcomes and the report itself argues convincingly on how these outcomes are achieved.

2.2.4. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 671-672) and the Annexes to it, and in the interviews conducted during the visit as well. The internship is organized during the final year of studies and its volume is 26 CP, of which 6 CP are obtained during the seventh semester and 20 CP during the eighth semester.
The internship coordinator at the organizational unit helps provide a place of internship for students. If additional assistance is required with finding a place for an internship, it is possible to apply to RTU Career Support and Service Centre, where a career consultant and a project manager help students with searching for and arranging places for internships. Since 2015, the students have had access to a webpage where companies are invited to place vacancies that are relevant for RTU students.
Internship at the already existing workplaces of students is also supported; this is possible in cases when the work tasks of the student at the existing workplace comply with the internship requirements. The internship tasks are formulated in accordance with the requirements of the undertaking and the study program and are monitored by the internship manager at the undertaking.
During the internship, regular consultations with the internship manager at the undertaking and the internship coordinator at the university are scheduled. The results of the first part of the internship are publicly presented. The second part of the internship (20 CP) is organized similarly to that of the first part. The results of the second part of the internship are presented in the form of a report and are publicly presented.
Annex P06 provides detailed information regarding the compliance of the study program with the state education standard.

2.2.5. Not applicable

2.2.6. The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 672-674) and the Annexes to it, and in the interviews conducted during the visit as well. During the reporting period, 46 students graduated from the program, having also completed their Bachelor's thesis. For their thesis, the students may select to develop a software product or a prototype according to their interests and in compliance with topical tasks in the modern IT industry. The topics of the thesis lie in the fields of Computer games; Accounting, registration, and resource management systems; Social life organization systems; Utility programs and tools; E-learning systems; Financial service IT systems; Embedded and real-time systems.
Most theses are in such areas as different accounting, registration, and resource management systems, utility programs and tools, as well as computer games and different solutions intended for the financial sector.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The compliance of the program with the pertinent professional standard depends upon the approval of the draft standard. The opportunities and provision of the internship offered to the students, as well as the organization of the work, are effective. The tasks of the internship are related to the learning outcomes of the study program, and the internship complies with the requirements of regulatory enactments. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' final theses are relevant to the field and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The organization of the internship is effective and the tasks are related to the learning outcomes.
5. The topics of the Bachelor's thesis are relevant to the program.

Weaknesses:
1. The soft skills of the graduates need further enhancement.
2. Student-centered teaching and learning approaches are not employed in full.
3. If the new professional standard is not approved, a risk of the program not being able to receive accreditation exists.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state (17 state-funded budget seats). From 2013 to 2021 funding has grown from 67 800 Eur to 72 858 Eur. The peak was in 2018/2019 with 73 985 Eur, but in 2019/2020 it was only 39 252 Eur. It is sufficient to support the program, but the reasons for the dip in 2019/2020 should be analyzed, and serious precautions should be taken, because a prolonged dip makes the program unsustainable.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period. However, funding, as it is determined by RTU itself, at least 19 students necessary to make the program fully sustainable. Hence, several approaches could be considered:
1. Increasing the number of students/program funding to make it sustainable.
2. Merge the program with an academic bachelor program.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculty and university, however, funding is becoming insufficient, and several different approaches could be pursued: increase of program funding or

merging of the program with an academic Computer science program.

Strengths:
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses:
1. Analysis to mitigate risks of potential funding drops was not performed.

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 provisions are sufficiently met to insure the achievement of the learning outcomes, however, since funding is becoming insufficient, in the future either funding should be increased or the program merged with the academic program.

2.4. Teaching Staff

Analysis

2.4.1. According to the SAR (p. 678), the total number of teaching staff in this study program is 61.
The responsible instructors of the courses are appointed by the head of the responsible structural unit. Instructors responsible for study courses can be professors, associate professors, and assistant professors with a scientific degree in the relevant branch or sub-branch of science. (SAR, p. 678)
All responsible instructors involved in the implementation of the study program hold doctoral degrees, but in total, 66% of the academic staff involved in the implementation of the study program hold doctoral degrees. (SAR, p. 678)
IT industry professionals are widely involved in the implementation of the study courses (e.g., Intars Garbovskis from Accenture, Pāvels jeļisejevs from C.T.Co). (SAR, p. 679)
Since 2019, several staff members have visited the State University of New York at Buffalo, USA for a semester-long internship. (SAR, p. 679)
The qualification of the teaching staff is fully compliant with the requirements of the study program.

2.4.2. In many cases, young colleagues start their careers at the Institute of Applied Computer Systems already during their studies by getting involved in research projects. (SAR, p. 683)
During the reporting period, four academic staff members of the study program obtained their doctoral degrees. (SAR, p. 678)
At two departments there were changes in teaching staff - at the Department of Artificial Intelligence and Systems Engineering, and at the Department of Software Engineering (7 changes in total listed by SAR, p. 684).
In the case of these academic staff changes, no significant changes in student feedback have been observed. The following principle is being obeyed the quality of the implementation of the study course must not be reduced by the arrival of new academic staff. (SAR, p. 685)
The changes made to the study program by younger academic staff give confidence in the quality of implementation of the study program and do not negatively affect it.

2.4.3. Not applicable

2.4.4. According to SAR (pp. 679-683) and Annex PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications.

2.4.5. All changes in the study program, as well as significant changes in the study courses, are discussed in the Council of the Institute of Applied Computer Systems, an important structure supporting the study program. Responsible instructors are appointed for the courses. (SAR, p. 686)
Academic staff also share their experience on other issues such as students' academic integrity, graduation papers, and conflict resolution. (SAR, p. 686)
The number of students per academic staff in the study program is 0.84. (SAR, p. 687)
Mutual cooperation of the teaching staff enables the successful implementation of the study program.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Experienced and well-motivated academic staff.
2. IT industry professionals are successfully involved.

Weaknesses:
1. Extremely low student/academic staff ratio (0.84 vs 9.35 in the corresponding academic program) due to the small number of students, as much more students are enrolled in the academic study program with the same name.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06_3.2.1_DCD0(42526)_AtbilstibaValstsStandartam_ProfBak_LV.pdf confirms that the study program complies with Cabinet Regulation No. 512 "Noteikumi par otrā 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 P07_3.2.1_DCD0(42526)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf confirms that the program is compliant with the standard of profession of the Programming Engineer, which is not yet approved.

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

Provided study course descriptions (Annex P10_DCD0(42526)_StudijuKursuapraksti_LV.zip) are prepared in Latvian and english. Descriptions comply with regulations set forth in 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 sample P28_DCD0(42526)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Provided resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet

Regulation. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Provided resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

A sample of the attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

Annex P15_2.1.4_StudijuTurpin_StudyContinue.zip (P15 2.1.4. RTU confirmation indicates that students have the opportunity to continue studies in the RTU study program "Information Technology" (acad. bachelor) or in relevant study programs at Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program fully complies with regulatory enactments, but the professional standard is not yet approved.

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from high school as well as benefiting from having acquired first-level professional higher education. The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The compliance of the program with the pertinent professional standard depends upon the approval of the draft standard. The program is well supported by the faculty and university, however, funding is becoming insufficient, and several different approaches could be pursued: increase of program funding or merging of the program with an academic Computer science program. The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. High demand for specialists in the industry.
2. Well-qualified teaching staff.

Weaknesses:
1. Very high drop-out rate.
2. Significant overlap with the academic bachelor study program having the same name.
3. Decrease in the number of students graduates (1 graduate in the study year 2019/2020, 0 graduates in 2020/2021) while the corresponding academic program has 60-80 graduates each year.
4. If the new professional standard is not approved, a risk of the program not being able to receive accreditation exists.

Evaluation of the study programme "Computer Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Computer Systems"

Short-term recommendations

1. One recommends that a thorough analysis is performed regarding the simultaneous existence of study programs having exactly the same name but different types (academic/professional), different duration, or different levels (bachelor/ master).
2. Consider the increase in the number of students and their retention and the increase of the number of graduates.

Long-term recommendations

1. Activities that will enhance the students' soft skills need to be included in the content.
2. Student-centered teaching and learning methods need to be employed in all courses.
3. RTU needs to plan for mitigating the risk of the new occupation standard not being approved.
4. Analysis of funding drop risks mitigation should be performed. And several different approaches could be pursued: increase of program funding or merging of the program with an academic Computer science program.

II - "Computer Science and Organizational Technologies " ASSESSMENT

II - "Computer Science and Organizational Technologies " ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The academic bachelor study program "Computer Science and Organizational Technologies" is part of the study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", for which it is a perfect fit. The program is fully compliant with the study field.

The study program "Computer Science and Organizational Technologies" is marketed under a different name - "Bachelor of IT Leadership"

2.1.2. The academic bachelor study program "Computer Science and Organizational Technologies" is coded as 43483 – educational program group "Computer systems, databases, and computer networks"; the degree issued upon graduation is Bachelor of Natural Sciences degree in Computer Control and Computer Science; the study duration is 4 years (full time) (160 credit points = 240 ECTS), the teaching language is English.
The declared goal of the program is "to provide students with the theoretical knowledge and research skills in the field of computer science, which is based on theoretical principles in the fields of information technology and computer science; to educate and train innovative-minded specialists focused on the introduction of new technologies and knowledge, as well as to ensure a set of knowledge, skills, and competences in accordance with the 6th level of the Latvian Qualifications Framework", which seems appropriate and justified in relations with the code, duration and degree of the program. The admission requirements of the study program are set in accordance with the Enrolment Requirements for Academic and Professional Undergraduate Study Programs approved by RTU Senate. The SAR pp. 971 describes the 3 criteria with their weight used for ranking the candidates: "Percentage scores of Centralized Examination (CE) in Mathematics, Foreign Language (English), the Latvian Language, Physics, or Chemistry are summed up and the resulting number is multiplied by 0.25; CE in Physics or Chemistry is taken into account in calculating rank if the CE has been passed. International English proficiency test score taken within the last 2 (two) years multiplied by 0.25; - TOEFL (Test of English as Foreign Language) paper-based test (test score divided by 677 and multiplied by 100); - TOEFL (Test of English as Foreign Language), Internet-based tests (RBS TOEFL code 7227); - IELTS (International English Language Testing System) test (test score divided by 9 and multiplied by 100); The scores obtained in the selection interviews (structured interview) are summed up, and the resulting number is multiplied by 0.5".

The title of the study program precisely characterizes the study field, the goal, and the outcomes of the study program. Graduates of the program are expected to be able to work as: Computer and Information Systems Managers, Computer Systems Analysts, Information Security Analysts, Computer Programmers, Software Developers, Web Developers, Network and Computer Systems Administrators, Computer User Support Specialists, Computer Network Support Specialists, Organization Technology Planners.

2.1.3. The program started in 2019. During the accreditation period, changes have been made to improve the quality of the study program based on current developments in the sector, employers' and students' recommendations:
1. The list of study program courses has been updated by including the study courses based on the experience regarding the implementation of the study programs at the partner universities (the University at Buffalo and BI Norwegian Business School): inclusion as compulsory (Latvian Language for Foreign Students), inclusion as compulsory elective (Strategy, US History, Business Research Methods, Statistics, Business Development Lab).
2. The study courses transferred from compulsory to elective and from elective to compulsory.
3. Some of the compulsory elective study courses have been archived based on the experience of the partner universities (the University at Buffalo and BI Norwegian Business School) (in fact the list of archived courses comprises mostly advanced computer science courses).
4. The free elective study courses (Part C) have been removed from the program, due to the fact that there is no need to provide additional courses for the foreign students within the program, as the study course "Latvian for Foreign Students" (VIL168) will be offered as compulsory. There are 5 remaining free choice courses in the curriculum (P09_3.2.1_DBT0(43483)_Studiju_plans.xlsx).
It should be mentioned that the changes seem to strengthen the business/organizational part of the curricula over the Computer Science part.

2.1.4. As described in the Self-Assessment Report, and fully acknowledged in the evaluation for an international scale, "Information technology is one of the most significant and fastest growing sectors of the Latvian economy, which constantly needs young specialists". As such, the need and justification for a study program that trains IT specialists are obvious.
The program started in 2019; the first graduation ceremony for students majoring in Computer Science and Organizational Technologies is planned for June 2023.
The bachelor study program "Computer Science and Organizational Technologies" starts on average with 25 students in the first year (the average over the last 3 academic years); the SAR does not present detailed statistics of the promotability of students and does not compare student academic performance with other related programs in the field.

2.1.5. Not applicable

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

Conclusions
The program title is compliant with the study field. The study program "Computer Science and Organizational Technologies" is marketed under a different name - "Bachelor of IT Leadership". The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable. The program is justified and aligned with the requirements of the labor market. The program is not joint but developed in close cooperation with the Riga Business School. It may be too early to tell about specific weaknesses, since the program started in 2019 and there are no graduates yet.

Strengths:
1. The study program is developed in partnership with the University at Buffalo and BI Norwegian Business School and can benefit from their experience.

Weakness:
2. The curriculum seems to provide a limited choice of elective courses (for instance 6 out of 7 courses in module B1 must be accessed, all courses in module B2 must be accessed, and 4 out of 5 courses of module B3 must be accessed).

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The Bachelor program "Computer Science and Organizational Technologies" (under name of "Bachelor of IT Leadership" in the real world) are provided as a 160 CP 4-year study program with two specializations: Computer Science – Artificial Intelligence and Data Representation and Management – General Management.

62 CP are allocated to the compulsory study courses part, 76 CP are allocated to the compulsory elective study courses part, from which 30 CP are designated as “Professional Specialized Electives” and 20 CP are designated as “Specialization courses”. In “Professional Specialized Electives” there are 7 study courses, from which students have to choose 6. For the specialization “Artificial Intelligence and Data Representation” students are provided with 4 different courses and have to take 4 courses. For the specialization “General Management” students are provided with 6 (7 - one course is 1 CP) different courses and have to take 4 courses. 12 CP are allocated to free elective study courses from different areas. 10 CP are allocated to the Bachelor Thesis.

According to the content, the core study courses are divided into several groups: fundamentals of ICT, mathematics, and statistics, field-specific study courses, general courses, additional field-specific study courses, free elective study courses, and a graduation paper.
The compulsory courses consist of mathematics, statistics, and the fundamentals of ICT. However, it also contains a few unrelated courses: (PBM 764) First Year Seminar, (PBM 768) STEM Communication, (PBM 727) Writing for Intercultural Communication.
From all compulsory elective study courses part, 10 CP are allocated to unrelated (PBM 748) Natural Sciences I and (PBM 748) Natural Sciences II courses. Furthermore, from non-specialization related courses in this part, 16 CP are allocated to general education study courses, where most of them are not related (PBM753 US History, PBM 712 Managerial Accounting, PBM 744 International Business) at all or very loosely related (PBM 735 Introductory Psychology, PBM716 Strategy).
From the compulsory elective study courses part, there is no clear distinction between how parts “Professional Specialized Electives” and “Specialization courses” differ. For example, PBM 773 Intro to Artificial Intelligence, which is part of “Professional Specialized Electives “ are presented in Year 4, while specialization courses for specialization Artificial Intelligence and Data Representation start in Year 2. At the very same time none of the 4 courses in “Specialization courses” are directly related to artificial Intelligence. Furthermore, it is not clear why more general PBM779 Software Engineering is only part of the specialization "Artificial Intelligence and Data Representation" and not part of the compulsory study courses. Given field of study and assigned code (Engineering) it should be. The second specialization General Management contains courses related to different management fields, but not to computer science or software engineering, which should be expected from the study program in this study field.
Also, it is unclear, why “Professional Specialized Electives” contains Intro to Microprocessors, Introduction to Visualisation, and Business Development Lab. Such introductory courses cannot be

considered part of a specialization.
Overall, apart from core study courses in the compulsory part and a few examples in the compulsory elective part, study courses/modules are NOT interconnected and complementary, more than often don’t correspond to the objectives of the program, and don’t ensure the achievement of learning outcomes.

2.2.2. Not applicable

2.2.3. Various methods are used to achieve the aims of the study program: theoretical lectures, homework, study project presentations, practical classes, seminars, case studies, tests, and exams are used. Most of the study courses consist of lectures, some sort of homework, and sometimes group work and a final exam. There is evidence that student-centered learning methods are sometimes used (group-based learning, practical work, extra help for the students who need it, and various types of materials). However, a wider variety of student-centered learning methods may be used and introduced even more widely. Student-centred learning is limited to individual courses. What is missing is more strudent-centred learning approach to the study programme as a whole. There are many theoretical courses that are not well-interconnected with application domain (College Calculus I, II, Introduction to Probability, Natural Sciences I, II, Introductory Psychology, Data Structures, Algorithm Analysis and Design, Software Engineering just to name few) and would benefit from active learning or project-based learning approaches, including change of main assassment from exam to project or similar. Or courses like Project Management, which should definitely have extended group project-based learning part. Furthermore, study programme would benefit from using, for example, CDIO framework (see more: http://www.cdio.org/cdio-vision) to futher enhance student-centred learning.

2.2.4. Not applicable

2.2.5. Not applicable

2.2.6. Not applicable, as the first defense of the bachelor's thesis will take place in 2023.

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

Conclusions
Overall, apart from core study courses in the compulsory part and a few examples in the compulsory elective part, study courses/modules are NOT interconnected and complementary, more than often don’t correspond to the objectives of the study program, and probably don’t ensure the achievement of learning outcomes. The study program contains many courses that are not relevant to the study field (wildest example: PBM753 US History). The study program provides two specializations “Artificial Intelligence and Data Representation” and “General Management” which are not well-aligned with the rest of the study program's content. It is not clear what are this study program's strengths or niche even compared with other study programs in this study field in RTU (for example, “Computer Systems” or “Information Technology” if a student wants to specialize in AI or Information Technology” and “Information Technology Project management” if a student wants to specialize in IT Project Management). Finally, the study program "Computer Science and Organizational Technologies" is marketed under a different name - “Bachelor of IT Leadership”.

Strengths:
1. None

Weaknesses:
1. Many courses are unrelated to the study field, both in the compulsory and compulsory elective parts.
2. Unclear distinction of parts “Professional Specialized Electives'' and “Specialization courses” and therefore, what exactly specializations in this study program constitute.
3. Weak selection of specialization courses. For example, for the specialization “Artificial Intelligence and Data Representation” only 2 courses (10CP) are somehow related to the specialization.
4. Unclear how the specialization “General Management” relates to the study field as it consists mostly of general management courses from different fields of study.
5. 2. The curriculum seems to provide a limited choice of elective courses (for instance 6 out of 7 courses in module B1 must be accessed, all courses in module B2 must be accessed, and 4 out of 5 courses of module B3 must be accessed).

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. According to the SAR, the study process is ensured by the academic and technical staff of FCSIT, including the following units of FCSIT and RTU: 1) FCSIT Institute of Information Technology; 2)FCSIT Institute of Applied Computer Systems; 3) FCSIT Institute of Intelligent Computer Technologies; 4) RTU Institute of Technical Physics; 5) RTU Faculty of E-learning Technologies and Humanities. RTU institutes and their departments ensure the training and methodological work: develop and update the curriculum, provide delivery of corresponding study courses, supervision and examination of final theses and carry out other activities related to teaching, methodological and research work.

Methodological and informative provision is based on the services provided by the RTU Scientific Library (SL). RTU Scientific Library is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure the RTU study process and research activities, as well as provides a library, bibliographic, and information services to RTU students, academic and general staff. The Library stocks more than 1.29 million printed documents and e-resources in RTU industry specific databases.
During the expert visit, it was identified that the library has an accessibility-based policy. The library is accessible to students 24/7. The extensive database is accessible remotely to the university staff and students through the ORTUS portal. The visit found no evidence that the library is not able to provide information support for the study program.
According to SAR, RTU provides funding for information resources for each study program according to certain financial calculations. The collection is replenished according to the recommendations of the heads of the study program, and researchers, in compliance with the allocated funding. Meetings with both teaching staff and students did not reveal any evidence of problems in the renewal of the library's information resources.
The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning

process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs. During the experts' visit, it was identified that the Moodle platform is widely used and accepted among the teaching staff and students.
The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable.

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of the students in the study program as well as in the faculty, combined with other funding sources, is sufficient.
The SAR pp. 980 declares that "The minimum number of students in the program to be cost-effective is 100 students per program. This means that a minimum of 25 students per year need to be enrolled in the program each year.".
SAR pp. 973 declares that "Figure 1 (annex 5) illustrates the dynamics of the number of admitted students in the period from 2019 to 2021." The figure (annex) is an external document, from which one finds the total number of students in two successive years and planned admissions and expenses. More informative is Annex DBT0(43848)_P5Pielikums.pdf form eplatforma.aika.lv, which states the actual number of students enrolled in the program; this is on average, over three academic years of 20, 23 and 21 respectively for the last 3 academic years; the program is not financially profitable.

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

Conclusions
Provision of the program is sufficient, but the program is not yet financially profitable. SInce no promotion has graduated yet it is still to early to decide on the medium/ long-term profitability of the program.

Strengths:
1. High-quality facilities for implementing the study process, ergonomic and well-equipped laboratories, a well-maintained and easily accessible library.
2. High-quality and responsive IT support.

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

Resources and provisions are sufficient.

2.4. Teaching Staff

Analysis

2.4.1. The qualifications of the academic staff are in compliance with the requirements for the implementation of the study program and the requirements set forth in the regulatory enactments.
In total, according to SAR 3.4.1., 33 academic staff members are involved in the implementation of the Bachelor study program “Computer Science and Organizational Technologies”, 14 instructors holding a Ph.D. degree and 18 instructors holding a Master's degree participate in the implementation of the study program. The program is implemented by teachers from two faculties: the Faculty of Computer Science and Information Technology, and the Faculty of Computing. Guest teachers from foreign universities and industry specialists are invited.
In SAR it is stated that the primary criteria for the selection of academic staff are Knowledge of the latest developments in their field; Pedagogical and didactical skills in the field, in line with the current trends; English language skills; and International experience and experience of studying or teaching at interdisciplinary programs. Unfortunately, there is no evidence provided that has been implemented. Moreover, while a number of different courses and other means to improve competencies are available for the teaching staff, it mostly depends on the lecturers, hence more systematic approach could be useful, i.e. analysis of individual needs, yearly planning, and formalization of the process.
In SAR 3.4.5. it is noted that the student-to-faculty ratio is kept consistently low so that RTU can provide individual counseling and feedback.

2.4.2. According to SAR 3.4.2. attracting new teachers, including Ph.D. students in computer science and management has been worked on. There are good examples of successful fulfillment of these activities such as engaging young teachers with international educational and professional experience as well as attracting foreign lecturers. In SAR 3.4.2. it was written that the composition of the academic staff has changed during the reporting period but no quantitative data are presented.

2.4.3. Not applicable.

2.4.4. As presented in the Self-Assessment Report pp. 94, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”.
The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has
developed key performance indicators based on the research (such as the number of citations of the publications)
and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost]
on the same criteria.
The Self-Assessment Report of the program (pages 981-983) does not mention any specific information about publications of the teaching staff, although the RTU shows an overall impressive list of publications (Annexs 2.4.4_Projekti(Pētījumi)Jaunrade_LV_Projects(Research)Creation_ENG.zip and 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip) in which the search for achievements related to a specific study program are very hard to identify.

2.4.5. From SAR 3.4. it is evident that there are substantial cooperation and exchange of experience among teaching staff by different means, including internationalization. In the SAR 3.4.5. it is written that the academic staff cooperates by developing descriptions of study courses and participating in projects. There is no reference to learning outcomes and learning design. Similarly, the positive aspects of in-service training of teaching staff have been elaborated in SAR 3.4.5., but the training is mainly related to the technology (e.g. LinkedIn, DigiExam, Coursera learning platform) in teaching and learning and not so clearly to innovative teaching and learning methods (that can be implemented with but also without technology).
Students are involved in the process of evaluating possible duplication of course content and that courses are implemented in accordance with the study program aims.

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

Conclusions
The qualifications of the academic staff are in compliance with the requirements for the implementation of the study program.
There are efforts to hire experienced and innovative teachers including foreign teachers which turn out to be successful. More analysis should be available to confirm the trends.
Substantial cooperation and exchange of experience among teaching staff by different means have been available and used, including internationalization. But it is not clear if all teachers benefit from that.

Strengths:
1. The program is implemented by teachers from two faculties. Guest teachers from foreign universities and industry specialists are invited.
2. Clear criteria for selection of teachers and specialists.
3. Engagement of young teachers with international educational and professional experience and attraction of foreign lecturers.
4. Training on how to use modern technology and tools to enhance teaching and learning.
5. Collaboration among teachers as well as taking into account students' perspectives.

Weaknesses:
1. Clear evidence is missing on which level teachers satisfy the selection criteria and if the renewal of teaching staff is at a satisfactory level (2.4., page 80).
2. A more systematic approach to individual teacher’s competencies development by providing individual needs analysis and annual planning of training and upgrading of teaching skills.

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

All criteria are satisfied. No major shortcomings have been identified. Minor weaknesses are related to analysis of teachers compliance with the selection criteria and individual needs analysis as a bases for annual planning of trainings.

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

P06_3.1.2_DBT0(43483)_Atbilstība_valsts_prasībām.pdf confirms that the study program complies with Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards”

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 (A10_DBT0(43483)_StudyCoursesdescr_Eng.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (01B00_DBT0(43483)_Diploms.zip)complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Confirmation - on compliance of the academic staff.edoc) and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic bachelor study “Computer Systems”

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

Study programme complies with regulatory enactments.

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

The program title is compliant with the study field. The study program "Computer Science and Organizational Technologies" is marketed under a different name - “Bachelor of IT Leadership”. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable. The program is justified and aligned with the requirements of the labor market. The program is not joint but developed in close cooperation with the Riga Business School.
Overall, apart from core study courses in the compulsory part and a few examples in the compulsory elective part, study courses/modules are NOT interconnected and complementary, more than often don’t correspond to the objectives of the study program, and probably don’t ensure the achievement of learning outcomes. The study program contains many courses that are not relevant to the study field (wildest example: PBM753 US History). The study program provides two specializations “Artificial Intelligence and Data Representation” and “General Management” which are not well-aligned with the rest of the study program's content. It is not clear what are this study program's strengths or niche even compared with other study programs in this study field in RTU (for example, “Computer Systems” or “Information Technology” if a student wants to specialize in AI or Information Technology” and “Information Technology Project management” if a student wants to specialize in IT Project Management). Finally, the study program "Computer Science and Organizational Technologies" is marketed under a different name - “Bachelor of IT Leadership”.
The qualifications of the academic staff are in compliance with the requirements for the implementation of the study program.
There are efforts to hire experienced and innovative teachers including foreign teachers which turn out to be successful. More analysis should be available to confirm the trends.
Substantial cooperation and exchange of experience among teaching staff by different means have been available and used, including internationalization. But it is not clear if all teachers benefit from that.

Strengths:
1. The program is implemented by teachers from two faculties. Guest teachers from foreign universities and industry specialists are invited.
2. Clear criteria for selection of teachers and specialists.
3. Engagement of young teachers with international educational and professional experience and attraction of foreign lecturers.
4. Training on how to use modern technology and tools to enhance teaching and learning.
5. Collaboration among teachers as well as taking into account students' perspectives.
6. High-quality facilities for implementing the study process, ergonomic and well-equipped

laboratories, and a well-maintained and easily accessible library.
7. High-quality and responsive IT support.
8. The study program is developed in partnership with the University at Buffalo and BI Norwegian Business School and can benefit from their experience.

Weaknesses:
1. Evidence is missing on which level teachers satisfy the selection criteria and if the renewal of teaching staff is at a satisfactory level.
2. A systematic approach to individual teacher's competencies development by providing individual needs analysis and annual planning of training and upgrading of teaching skills.
3. Many courses are unrelated to the study field, both in the compulsory and compulsory elective parts.
4. Unclear distinction of parts "Professional Specialized Electives'' and "Specialization courses" and therefore, what exactly specializations in this study program constitute.
5. Weak selection of specialization courses. For example, for the specialization "Artificial Intelligence and Data Representation" only 2 courses (10CP) are somehow related to the specialization.
6. Unclear how the specialization "General Management" relates to the study field as it consists mostly of general management courses from different fields of study.
7. The curriculum seems to provide a limited choice of elective courses (for instance 6 out of 7 courses in module B1 must be accessed, all courses in module B2 must be accessed, and 4 out of 5 courses in module B3 must be accessed).

Evaluation of the study programme "Computer Science and Organizational Technologies "

Evaluation of the study programme:

Average

2.6. Recommendations for the Study Programme "Computer Science and Organizational Technologies "

Short-term recommendations

1. Consider implementing a consistent plan for monitoring and reducing the student drop-out rate for each academic year.
2. Consider adding more elective courses to the program curriculum, such that the specialization modules (B1, B2, B3) offer real choice. Consider the uniformization of the credit points between the disciplines of specialization modules, such that the number of credit points of each discipline is a divisor of the total number of credit points allocated for the module.
3. Match the marketed name of the study program to the actual name of the study program.
4. Rework the learning outcomes, the content of the study program, and the content of the study courses both to the niche of the study program and the specialization (or specializations) of the study program.
5. Individual study course outcomes don't correspond well to study programs' learning outcomes. Consider a change in mapping: instead of mapping study program learning outcomes to study course (and learning outcomes), map study courses to study program outcomes. Also, consider applying Bloom's Taxonomy or a similar framework when assessing how individual study outcomes contribute to and fulfill study program learning outcomes.

Long-term recommendations

1. Increase the number of project-based courses and group-learning-based courses where it is possible to attain soft skills through learning by doing. Consider more module-based courses, merging similarly themed courses to make room for more project-based and group-learning-based approaches and limit the number of courses that students have to learn in parallel.
2. Increase the number of courses where project themes or topics are provided by the industry.
3. Consider creating student portfolios as part of their potential CV. For example, support and request creating git repositories with all student coding and project activities.
4. Consider internships in groups, where companies get student groups that are working on some project that the company has provided.
5. Communicate research opportunities to students earlier in their studies and make them more systematic.
6. Consider creating a system, where systematic issues with study programs and study courses can be followed up and raised in severity and importance if they persist through the years.
7. Consider collecting systematic evidence about the level teachers satisfy the selection criteria and if the renewal of teaching staff is at a satisfactory level.
8. Based on a systematic analysis of needs on individual teachers' level develop opportunities for competences development by providing annual planning of training and upgrading of teaching skills.
9. Establish study programs' strengths or niches even compared with other study programs in this study field in RTU.

II - "Computer Systems" ASSESSMENT

II - "Computer Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The contents of the study program are oriented to software engineering, information technology, computer science, and also computer engineering and computer control. (SAR, p. 427) Most of the courses of the program (Annex P09_3.2.1_DBD0(43526)_Plans_lv_Plan_eng.pdf) cover topics of ICT. The content is very close to the corresponding professional bachelor study program, differing mostly in the internship.

2.1.2. The title of the study program is Computer Systems.
The code of the study program – 43526 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `43` notes that this study program is academic bachelor study program and the last three digits `526` indicate that this study program is related to the educational group of "other engineering sciences"
The degree to be acquired: Bachelor's Degree of Engineering Science in Computer Systems.
The 9 tasks (objectives) of the program correspond to the goal to prepare professionals for starting independent work in the field of informatics with knowledge in software engineering, research and

solving computer engineering problems, computer systems development, systems analysis and modeling, fundamentals of database technologies and artificial intelligence, as well as with the ability to demonstrate systems thinking and/or systems approach and participate in a software development project, fulfilling different roles, who demonstrate professional ethics and knowledge/skills complying with IT industry standards.
The results of the study program (learning outcomes) are adequate (6 outcomes) for the academic bachelor's degree and comply with the aim and objectives of the study program. Learning outcomes include both theoretical knowledge and practical skills and competencies in software development technologies, as well as the ability to analyze and communicate things.
Admission requirements (general or vocational secondary education) comply with the state regulations, where persons with secondary education can apply for the study program "Computer Systems".
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (2 implementation variants) –
● Full-time studies with a duration of 3 years (120 CP/180 ECTS) implemented in Latvian.,
● Full-time studies with a duration of 3 years (120 CP/180 ECTS) implemented in English.
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. The process of developing Bachelor Papers has been unified within the faculty. (SAR, p. 426)
The classification code was changed to 43526, and the degree was changed to Bachelor of Engineering in Computer Systems (in accordance with Latvian Republic Cabinet Regulations No. 322 of 13 June 2017). (SAR, p. 426)
The volume of the program was changed from 121 CP in 2013 to 120 CP in 2022 (in accordance with Cabinet Regulations, No. 240 of 13 May 2014, “Regulations on the State Academic Education Standard”). (SAR, p. 426)
The changes made are reasonable and justified for the program's evolution.

2.1.4. Graduates of engineering and IT sciences are in wide demand in the labor market, as can be seen from the advertisements. (SAR, p. 429)
Graduates of the study program can start a professional career in ICT companies by performing a variety of roles. (SAR, pp. 428, 429)
Graduates are mostly working in their major, working in higher qualification professions already one year after graduation, and earning salaries that are well above the national average. (SAR, p. 429)
The study program is highly rated in prakse.lv surveys. (SAR, p. 429)
According to Annex P05_3.1.4_DBD0(43526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, in recent years, the annual number of admitted students is 286-394, making the total actual number of students in the program 614-981, whilst the annual number of graduates is 53-82, in all cases with the tendency to decrease in the last years.
Most students are state-funded, and there is an increasing ratio of self-paid students (45% or 437 out of 981 students as of 2020/2021).

2.1.5. Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are more specialization-focused and are fully in line with the goals of this

qualification. Admission to studies is made according to external and internal requirements after graduating from high school.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.
2. Sufficient and increasing amount of self-paid students.

Weaknesses:
1.Significant overlap with the corresponding professional bachelor study program having the same name.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 432-434) and the Annexes to it, and in the interviews conducted during the visit as well. The compulsory part of the study program includes courses that amount to 86 CP. These offer in-depth knowledge of the field of computer science in general and its formal foundations and develop the ability to choose appropriate methods for solving a problem, as well as the ability to implement algorithms appropriate to the problem and to use software development environments and tools.
Field-specific courses build the technical knowledge base for practical problem-solving and decision-making. Students can choose field-specific study courses according to their professional interests, focusing more on software development, artificial intelligence, or systems analysis.
The courses in humanities that are included in the compulsory elective part of the program and the group work included in the other courses develop the social competencies necessary for an IT professional, the ability to continue education and development, and critical and creative thinking. Free elective courses allow students to choose according to their professional interests and needs. Regular analysis and updating of study courses eliminate overlaps and duplication. The need for enhanced soft skills among graduates has been noted by employers.
Annex P08 (P08_3.2.1_DBD0(43526)_Kartejums_lv_Mapping_eng.pdf) of the self-evaluation report provides a comprehensive mapping of the learning outcomes of the courses against those of the program. The mapping indicates that the achievement of the former leads to the achievement of the latter.
The courses are regularly updated, as is also the curriculum, so as to ensure the provision of relevant content, in line with the needs of the labor market and the trends in the IT field.
Annex P06 (P06_3.2.1_DBD0(43526)_AtbilstibaValstsStandartam_AkadBak_LV.pdf) of the self-evaluation report provides a comprehensive mapping of the requirements for compliance of the study program with all relevant national regulations.

2.2.2 Not applicable

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 434-437) and the Annexes to it, and in the interviews conducted during the visit as well. Lectures, practical classes, laboratory and independent work implemented individually and in groups, tests, and a graduation paper are employed as teaching methods, at the discretion of the instructors. The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.

The students are offered a wide variety of learning materials (documents, presentations, video recordings, interactive learning materials, etc.). They have the right to propose their own topic for the graduation paper, thus achieving learning outcomes in an area that interests them. Additionally, they have the opportunity to receive individual tutorials from the academic staff involved in the study program. Further, a wide range of extra-curricular activities is offered to the students.
As stated above, Annex P08 (P08_3.2.1_DBD0(43526)_Kartejums_lv_Mapping_eng.pdf) of the self-evaluation report provides a comprehensive mapping of the courses against the program learning outcomes and the report itself argues convincingly on how these outcomes are achieved.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 438-441) and the Annexes to it, and in the interviews conducted during the visit as well. During the reporting period, 466 students graduated from the study program, having also completed their Bachelor's thesis. The study program offers students thesis topics related to both traditional and fundamental approaches to software development, as well as topics related to the application and research of modern technologies and methods.
The Institute of Applied Computer Systems maintains productive collaborations with industry, thus some students select thesis topics defined by and relevant to the industry. The topics of the theses lie in the fields of Artificial intelligence; Data storage, search and processing technologies; Systems theory, systems analysis, design, modeling, and systems engineering; E-learning systems; Information systems security; Software development technologies and programming languages; Operating systems and systems programming; Quality of software development processes; E-business solutions. Most theses are on topics that directly correspond to software development technologies and programming languages.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' final theses are relevant to the field and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The topics of the Bachelor's thesis are relevant to the program.

Weaknesses:

1. The soft skills of the graduates need further enhancement.
2. Student-centered teaching and learning approaches are not employed in full.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state as well as local and foreign students fees (179 state-funded budget seats). From 2013 to 2021 funding has grown from 629 043 Eur to 1 627 264 Eur. The number of foreign students is increasing as well. Financially it is one of the best programs.
We consider that the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculty and university, the funding is constantly increasing.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
2. Funding is constantly increasing.
3. Number of foreign students paying fees is increasing.

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 provisions are sufficiently met to insure the achievement of the learning outcomes

2.4. Teaching Staff

Analysis

2.4.1. According to the SAR (p. 445), the total number of teaching staff in the study program is 70.
The responsible instructors of the courses are appointed by the head of the responsible structural unit. Instructors responsible for study courses can be professors, associate professors, and assistant professors with a scientific degree in the relevant branch or sub-branch of science. (SAR, p. 445)
All responsible instructors involved in the implementation of the study program hold doctoral degrees, but in total, 79% of the academic staff involved in the implementation of the study program hold doctoral degrees; the number of guest teaching staff is 26 (total during the reporting period). (SAR, p. 445)
Guest lecturers from IT companies in Latvia and abroad, as well as from foreign universities in Lithuania, Serbia, Slovakia, and other countries are involved. (SAR, p. 445)
IT industry professionals are widely involved in the implementation of the study courses (e.g., Uldis Karlovs-Karlovskis from Accenture, Mārtiņš Leitass from Emergn). (SAR, pp. 446-448)
Since 2019, several staff members have visited the State University of New York at Buffalo, USA for a semester-long internship. (SAR, p. 448)
The qualification of the teaching staff is fully compliant with the requirements of the study program.

2.4.2. In many cases, young colleagues start their careers at the Institute of Applied Computer Systems already during their studies by getting involved in research projects. (SAR, p. 453)
During the reporting period, four academic staff members of the study program obtained their doctoral degrees. (SAR, p. 445)
At two departments there were changes in teaching staff - at the Department of Artificial Intelligence and Systems Engineering, at the Department of Software Engineering (15 changes in total listed by SAR, pp. 454, 455).
In the case of these academic staff changes, no significant changes in student feedback have been

observed. The following principle is being obeyed the quality of the implementation of the study course must not be reduced by the arrival of new academic staff. (SAR, pp. 454, 455)
The changes made to the study program by younger academic staff give confidence in the quality of implementation of the study program and do not negatively affect it.

2.4.3. Not applicable

2.4.4. According to SAR (pp. 449-453) and Annex 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications.

2.4.5. All changes in the study program, as well as significant changes in the study courses, are discussed in the Council of the Institute of Applied Computer Systems, an important structure supporting the study program. Responsible instructors are appointed for the courses. (SAR, p. 456)
Academic staff also share their experience on other issues such as student's academic integrity, graduation papers, and conflict resolution. (SAR, p. 456)
The number of students per academic staff in the study program is 9.35. (SAR, p. 457)
Mutual cooperation of the teaching staff enables the successful implementation of the study program.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Experienced and well-motivated academic staff.
2. IT industry professionals are successfully involved.

Weaknesses:
none

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

There is full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06_3.2.1_DBD0(43526)_AtbilstibaValstsStandartam_AkadBak_LV.pdfconfirms that the study program complies with Cabinet Regulation No. 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

Provided study course descriptions (P10_DBD0(43526)_StudijuKursuapraksti_LV.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample P28_DBD0(43526)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Confirmation is provided (Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

The clause has been removed from law as of 14.07.2022.

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

Provided resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation.. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Privided resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

Annex P15_2.1.4_StudijuTurpin_StudyContinue.zip P15 2.1.4. RTU confirmation indicates that students have the opportunity to continue studies in RTU study programs “Information Technology” (acad. bachelor) or “Computer Science and Organizational Technologies” (acad. bachelor) or in relevant study programs in Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

Study programme fully complies with regulatory enactments.

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are more specialization-focused and are fully in line with the goals of this qualification. The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The program is well supported by the faculty and university, the funding is constantly increasing. The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.
2. Sufficient and increasing number of self-paid students.
3. Good provision of the program - new or renovated buildings, well-equipped laboratories, and library

Weaknesses:
1. Very high drop-out rate.
2. Significant overlap with the professional bachelor study program having the same name.

Evaluation of the study programme "Computer Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Computer Systems"

Short-term recommendations

1. One recommends that a thorough analysis is performed regarding the simultaneous existence of study programs having exactly the same name but different types (academic/professional), different duration, or different levels (bachelor/ master)

Long-term recommendations

1. Activities that will enhance the students' soft skills need to be more enhanced in the content.
2. Student-centered teaching and learning methods need to be employed in all courses.

II - "Information Technology" ASSESSMENT

II - "Information Technology" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The academic bachelor study program "Information Technology" is part of the study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", for which it is a perfect fit. The study program is in the correct study field according to ACM/IEEE "A Report in the Computing Curricula Series". The title of the program is accurate. The program is fully compliant with the study field.

2.1.2. The academic bachelor study program "Information Technology" is coded as 43526 – educational program group "Other engineering sciences" in the thematic field "Engineering Science and Technology"; the degree issued on graduation is Bachelor of Engineering Sciences in Information Technology; the study duration is 3 years (full time studies) (120 credit points = 180 ECTS), the teaching language is Latvian.
The declared goal of the program is "To educate professionals with higher education in information technology who are able to function as a user advocate and select, create, apply, integrate and administer computing technologies to meet the needs of users within a societal and organizational context", which seems appropriate and justified in relations with the code, duration, and qualifications of the program.
The title, code, the degree to be obtained of the study program, aims, objectives, learning outcomes and admission requirements (public competition for enrolment, organized according to RTU Senate approved rules "Admission Rules for Academic and Professional Bachelor Programs", where candidates are ranked according to the grades in mathematics and physics, or a foreign language, according to SER pp. 538.) are interrelated. The duration and scope of the study program implementation, as well as the implementation language, are reasonable and justified. The aims of the program are reasonable. Graduates of the study program work as IT specialists.

2.1.3. The corrections made to the study program's parameters within the assessment of the study field are analyzed and sufficiently justified. During the period from the last external evaluation, two corrections have been performed in the parameters of the study program.
First, and most importantly, the classification code of the study program has been changed. During the previous accreditation period, the study program code was 43481, which represented the group of educational programs in Computer Science in the thematic group Natural Sciences, Mathematics, and Information Technologies. The change of the code was made pursuant to Cabinet Regulation No 322 of 13 June 2017.
The most relevant code for the study program is 43526 – educational program group "Other engineering sciences" in the thematic field "Engineering Science and Technology". Engineering sciences and technologies are the strategic field of specialization of Riga Technical University and the organizational unit in charge of the study program implementation works in the scientific field of Electrical Engineering, Electronics, Information, and Communication Technology. The study program

is designed according to the uniform RTU requirements for study programs that prescribe the integration of engineering science-related study courses into compulsory study courses. The question is whether the classification categories themselves could be amended to include more recent and modern categories since multiple study programs are classified under such a nondescript category.
The second change involved the change of the overall study load from 122 CP to 120 CP as required by the regulations that one year of studies is 40 CP. The course of General Chemistry (2 CP) was excluded from the study program according to changes to the uniform RTU requirements for study programs. This is fully justified.

2.1.4. As described in the Self-Assessment Report, and fully acknowledged in the evaluation for an international scale, “Information technology is one of the most significant and fastest growing sectors of the Latvian economy, which constantly needs young specialists”. As such, the need and justification for a study program that trains IT specialists are obvious.
The major employers for the graduate (and students) of the “Information Technology” program are “Accenture”, “Tieto”, “Latvenergo”, “TET”, “ZZ Dats”, “Luminor”, “Visma”, " Wonderland Media”, “Squalio Cloud Consulting”, “Ernst & Young”, “Latvijas Mobilais Telefons”, “C.T.Co”, “Scandiweb” (i.e. both national and international firms/corporations). The unemployment rate among program graduates is very low (less than 2%), which is expected (although the presented data are rather old, from 2017/2018).
The study program enrolls quite a high number of students and the number has been increasing in recent years to close to 200 - care must be taken to ensure the quality of teaching with an increasing number of students.
The bachelor study program “Information technology” starts on average with 172 students in the first year (the average over the last 9 academic years); in the final year of study (the third), on average, there are 137 students enrolled. The average number of graduates is 52, which represents 30% of the total admission and 38% of the students in their final year. These numbers represent a high dropout of students, in both the first year of study and in the last year of study (failure to prepare/defend the dissertation). The reasons identified in the Self-Assessment Report are the “level of pre-existing knowledge of students, and results of centralized secondary education exams do not always reflect precisely the students’ level of preparedness” and the early employment during the studies. The management of the program is thus aware of this situation and considers some corrective actions (more selective admission process, better tutoring during the preparation of the final dissertation).

2.1.5. Not applicable

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

Conclusions
The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are fully in line with the goals of this academic bachelor program. Admission to studies is made
according to external and internal requirements after graduating high-school. The title, code, and degree of the study program are reasonable and interrelated and match the requirements The changes to the parameters of the study program are justified and reasonable. The program is fully justified and aligned with the requirements of the labor market.

Strengths:
1. The number of students is quite high and growing which shows the attractiveness of the program

among high school graduates which implies a high-value proposition of the study program.
2. The program addresses a wide area of potential employers in the labor market.

Weaknesses:
1. Average graduation number is low and additional effort should be made to increase it (increase admission constraints, better tutoring/ mentoring of the students during their studies).
2. There is no effective surveying of the employment rate of the graduates.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. Academic bachelor study program ''Information Technology'' is provided as 120 CP 3-year study program with specializations in compulsory elective study courses in 3rd year (15 CP in total). 86 CP is allocated to the compulsory study courses, 20 CP are allocated to compulsory elective study courses, 4 CP are allocated to free elective study courses and 10 CP are allocated to Bachelor's Thesis.
According to the self-assessment report, the compulsory study courses cover industry guidelines, principles, structure, and methodology (25 CP), study courses devoted to the history of the field development and relevant problems (10 CP), and study courses devoted to characterization and intersectoral issues of the sector (15 CP).

In terms of topics, the compulsory study courses cover Mathematics (9 CP), Analytical methods and discrete mathematics (15 CP), and Physics (6 CP). The basics of IT knowledge are programming and algorithmization (14 CP), Computer engineering and systems 12 CP, Data processing and information systems (7 CP), and Modelling of complex systems (6CP).

The compulsory elective courses consist of field-specific study courses (15 CP), Humanities and social sciences study courses (2 CP), and Languages (3 CP). There are 13 different field-specific study courses with a variety of IT-related topics and there is an option for internship (4 CP). Humanities and social sciences study courses are related to sociology or politology and are joint study courses, thus not much interconnected to IT. Languages course a) is not required by law or regulations of the Minister Cabinet nor is complementary to the field of study.
Overall, the content of the study program is topical, and the content of the study courses is not always well interconnected and complementary. For example, Mathematics and Physics are joint study courses for many different study programs and lack interconnection to specific IT applications. Compulsory elective study courses (B2) in Humanities and social sciences contain very general topics and are not customized for the study program or the learning outcomes.

2.2.2. Not applicable

2.2.3. Various methods are used to achieve the aims of the study program: theoretical lectures, homework, study project presentations, practical classes, seminars, case studies, tests, and exams are used. Most of the study courses consist of lectures, some sort of homework, and sometimes group work and a final exam. There is evidence that student-centered learning methods are sometimes used. Project-based and group-learning-based approaches are limited and there are a lot of courses that students have to learn in parallel. However, a wider variety of student-centered learning methods can be introduced even more widely. Student-centered learning is further limited by the large overlap of courses with study programs "Computer Science" and "Intelligent Robotic Systems":
Overlap with "Intelligent Robotic Systems":

Mathematics 9 CP
Discrete Mathematics 3 CP
Probability Theory and Mathematical Statistics 2 CP
Random Processes 2 CP
Numerical Methods 2 CP
Physics 6 CP
= 24 CP
Discrete Structures of Computer Science 2 CP
Data Structures 3 CP
Algorithmization and Programming of Solutions 6 CP
Object-Oriented Programming 3 CP
Introduction to Computer Architecture 3 CP
Basics of Computer Control 3 CP
= 20 CP
Fundamentals of Computer Graphics and Image Processing 2 CP
Fundamentals of Artificial Intelligence 3 CP
= 5 CP
Innovative Product Development and Entrepreneurship 4 CP
Environment and Climate Roadmap 1 CP
Civil Defence 1 CP
Languages 3 CP
Humanities and social sciences study courses 2 CP
= 11 CP
= 24 + 23 + 2 + 11 = 70 CP out of 110 CP
Such overlap of study courses, including what would be large-scale classrooms (up to 300 students) limits individualized, or study field-specific approaches, where even theoretical knowledge can be learned already with the field-specific application. (e.g. learning programming on application development or similar).

2.2.4. Not applicable

2.2.5. Not applicable

2.2.6. During the reporting period (from 2015/2016 to 2020/2021 - as per self-assessment report), 356 Bachelor students defended their Bachelor Theses. The largest set of bachelor theses has been in big data technologies (44), progressive web technologies (42), and agile software development (23). These topics are relevant to the field and have been in part with industry trends. The same can be said for the rest of the topics mentioned in the self-assessment report. Around 10% of the thesis is being supervised/consulted by company representatives. And there is also a good number (30 - not clear in which time frame) of the thesis that has been developed in cooperation with institutions and companies and few that are developed in cooperation with other researchers/research institutions.

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

Conclusions
Overall, the content of the study programme is topical and relevant to the needs of the industry and most of the students and graduates have no problem entering the industry. However, the content of the study courses could be better interconnected and more complementary. Often individual study course outcomes don’t correspond well with the study programs’ learning outcomes. Some general

elective courses are shared with many other study programmes, which also limits the ability to use some student-centered learning approaches and methods. Also, both students and industry partners highlight the lack of soft skills in graduates. Topics of defended Bachelor Theses are relevant to the field and have been in part with industry trends.

Strengths:
1. The content of the study program is good and relevant to the needs of the industry, labor market, and scientific trends.

Weaknesses:
1. The content of the study courses is not always well interconnected and complementary—especially mathematics and physics with IT-related topics.
2. Study programme learning outcomes and levels of learning outcomes are not well-align for similar study programmes in the same study level even if the content is partially overlapping. The same course achieves different learning outcomes or different levels of learning outcomes in different study programmes (even when considering the different fields of study) - just as an example MFZ101 in 43526 - Information Technologies and 43526 - Intelligent Robotics System.
3. Project-based and group-learning-based approach to allow the development of soft skills and further enhance student-centered learning is somehow limited as there are a lot of courses that students have to learn in parallel.
4. Relatively few CP are allocated to field-specific study courses.
5. Relatively limited specialization possibilities. While there are different courses for specialization they are more or less independent topics (apart maybe from simulations/big data topics - Large Databases, Cloud Computing, Simulations, Artificial Neural Networks).

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. According to the SAR, the study process is ensured by the academic and technical staff of FCSIT, including the following units of FCSIT and RTU: 1) FCSIT Institute of Information Technology; 2)FCSIT Institute of Applied Computer Systems; 3) FCSIT Institute of Intelligent Computer Technologies; 4) RTU Institute of Technical Physics; 5) RTU Faculty of E-learning Technologies and Humanities. RTU institutes and their departments ensure the training and methodological work: develop and update the curriculum, provide delivery of corresponding study courses, supervision and examination of final theses and carry out other activities related to teaching, methodological and research work.

Methodological and informative provision is based on the services provided by the RTU Scientific Library (SL). RTU Scientific Library is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure the RTU study process and research activities, as well as provides a library, bibliographic, and information

services to RTU students, academic and general staff. The Library stocks more than 1.29 million printed documents and e-resources in RTU industry specific databases.
During the expert visit, it was identified that the library has an accessibility-based policy. The library is accessible to students 24/7. The extensive database is accessible remotely to the university staff and students through the ORTUS portal. The visit found no evidence that the library is not able to provide information support for the study program.
According to SAR, RTU provides funding for information resources for each study program according to certain financial calculations. The collection is replenished according to the recommendations of the heads of the study program, and researchers, in compliance with the allocated funding. Meetings with both teaching staff and students did not reveal any evidence of problems in the renewal of the library's information resources.
According to the SAR modern software that corresponds to educational needs and the current trends is used in the study process: FCSIT cloud computing platform “CloudStack”, MatLab, CPLEX, Microsoft, SAP, JetBrains, JIRA, ARENA, software tools ARENA VISUAL DESIGNER, ARENA INPUT ANALYZER, ARENA OUTPUT ANALYZER, OPTQUEST for ARENA and SIMUL8, etc. During the visit and meetings with RTU staff and students, there was no evidence of any problems with the available software resources.
The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs. During the experts' visit, it was identified that the Moodle platform is widely used and accepted among the teaching staff and students.
The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable.

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the study program as well as in the faculty, combined with other funding sources, is sufficient.
SAR pp. 919 mentions that "During the reporting period, the total financing of the study programme (consisting of subsidies for
the programme and tuition fees of local students) has increased by 29%. The increase in funding per student has increased by 15%."
In the reporting period, he average number of students enrolled in all years is about 240 (SAR, pp. 903), with around 110 students in the first year. The number of students is sufficient, although there is a high drop-out rate (the average number of graduates is about 25 - SAR pp. 904).

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

Conclusions
The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master's program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the

program implementation in this current form.

Strengths:
1. High-quality facilities for the implementation of the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library.
2. High-quality and responsive IT support.

Weaknesses:
1. There is a high drop-out rate and a low graduation rate.

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

High-quality facilities for the implementation of the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library.

2.4. Teaching Staff

Analysis

2.4.1. The academic staff of the academic study program complies with the requirements for the implementation of the study program set in the regulation with 23 professors and 18 associated professors and 21 assistant professors. Qualifications of the teaching staff seem appropriate, most of them having Ph.D. in engineering (43) and mathematics (8) and fulfilling research requirements (SAR, 3.4.1).
In the SAR (3.4) it is written that the teachers that teach in the first academic year have high pedagogical qualifications and they support students with learning gaps and that the academic staff also have published publications on didactics and e-learning. Additionally, some members of the academic staff participated in professional development programs and a few in Erasmus mobility. Nevertheless, it seems, based on the SAR and interviews, that systematic development of teaching competencies (student-centered teaching, learning outcomes-based learning design of courses aligned with study program learning outcomes, etc.), besides digital skills development, are not provided. Systematic professional development can contribute to decreasing of drop-out rate as well.
Namely, in the SAR it is stated that the number of students is optimal and that around 30% of students are expelled. Cause of that can be threefold: (1) teachers are overboard and do not provide enough support for students; (2) Teachers and the study program do not know how to support students in the first year; (3) enrollment requirements for students are not adequate.
The current student-to-staff ratio is 18, which is adequate and the academic staff is motivated. Gender disbalance towards male domination among academic staff, as well as the issue of the “glass ceiling” (fewer women in managerial positions and in women professors with the highest ranks), has to be considered.
Positive aspects are that additional tutoring and classes in math for first-year students are provided (math is the main problem causing high dropout) and since undergraduate thesis seems to be a problem as well, mandatory pre-defense of the thesis is introduced to solve it.

2.4.2. The RTU and the department take care that changes in the composition of the teaching staff

do not negatively affect (SAR, 3.4.2) the quality of the implementation of the study program and the compliance of the study program with the requirements specified in regulatory enactments. The average age of academic staff has been decreasing since 2016, and the number of staff in the highest rank has been decreasing but the number of younger professors (associate and assistant) has been increasing as well as the number of assistants that can support students individually in their practical work. In SAR 3.4.2. the situation is described as stable.

2.4.3. Not applicable.

2.4.4. According to SAR (pp. 921-923) and Annex 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications. Teaching staff achievements are in accordance with the Law on Higher Education Institutions.

2.4.5. In the SAR 3.4.5. the composition of the study program (sequencing of courses) has been described. It is also mentioned that the experience exchange amongst the academic staff is promoted at the methodological seminars. Student surveys have been conducted and significant overlapping of the courses was detected based on which curriculum was amended. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program would benefit from a more coherent study program and course design.

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

Conclusions
The academic staff of the academic study program complies with the requirements and no major shortcomings have been identified. Additional efforts are invested by academic staff to support students with bridging courses. But students will benefit from systematic professional development of teaching competencies of the academic staff and academic mobility, especially in the meaningful implementation of learning outcomes. The situation with academic staff is stable with more younger professors and academic staff coming in. The experience exchange amongst the academic staff is promoted and mutual learning can be structured and strengthened by using a study program and course learning design approach.

Strengths:
1. The academic staff of the academic study program complies with the requirements and no major shortcomings have been identified.
2. More younger professors and academic staff are coming in.
3. Using student surveys for study program improvements.

Weaknesses:
1. Systemic development of teaching competencies (besides digital skills) of the academic staff, especially in the meaningful implementation of learning outcomes is not fully implemented.
2. Support for academic mobility is not fully implemented.
3. Gender disbalance towards male domination, especially the “glass ceiling” effect (women at higher positions).

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

All criteria are satisfied. No major shortcomings have been identified. Minor shortcomings are related to lack of systematic development of teaching competences, substantial support for mobility and gender disbalance among teachers.

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

P06_3.2.1_DBI0(43526)_AtbilstibaValstsStandartam_AkadBak_EN.pdf confirms that the study program complies with Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards”

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 (A10_DBI0(43526)_StudyCoursesdescr_ENG.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (DBI0_AkadProgr_Diploms_EN.zip)complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Confirmation - on compliance of the academic staff.edoc) and SAR 3.4. indicates compliance with requirements set forth by 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

The clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation . Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic bachelor study “Computer Systems”

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not

accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program is compliant with all requirements.

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

The program title is compliant with the study field. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable. The program is fully justified and aligned with the requirements of the labor market. Overall, the content of the study program is topical and relevant to the needs of the industry and most of the students and graduates have no problem entering the industry. However, the content of the study courses is not always well interconnected and complementary. Often individual study course outcomes don’t correspond well with the study programs’ learning outcomes. Some general elective courses are shared with many other study programs, which also limits the ability to use some student-centered learning approaches and methods. Also, both students and industry partners highlight the lack of soft skills in graduates. Topics of defended Bachelor Theses are relevant to the field and have been in part with industry trends. The program has high-quality facilities for the implementation of the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library. The academic staff of the academic study program complies with the requirements.

Strengths:
1. The number of students is quite high and growing which shows the attractiveness of the program among high school graduates which implies a high-value proposition of the study program.
2. The program addresses a wide area of potential employers in the labor market.

Weaknesses:
1. Average graduation number is low and additional effort should be made to increase it (increase admission constraints, better tutoring/ mentoring of the students during their studies).
2. The survey on the professional trajectory of graduates is not performed.
3. Relatively few CP are allocated to field-specific study courses.
4. Relatively limited specialization possibilities. While there are different courses for specialization they are more or less independent topics (apart maybe from simulations/big data topics - Large Databases, Cloud Computing, Simulations, Artificial Neural Networks).

Evaluation of the study programme "Information Technology"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Information Technology"

Short-term recommendations

1. The employment numbers of the graduates are obtained as part of a centralized Latvian State graduates survey which is not very effective and requires more targeted surveys to determine employment information in more depth - consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
2. Consider the implementation of a mentoring/ tutoring mechanism for all the students (at least at the bachelor level based on the implication of the teaching staff.
3. Consider implementing a consistent plan for the reduction of the student drop-out rate.
4. Organize opportunities for the systemic development of teaching competencies (besides digital skills) of the academic staff, especially in the meaningful implementation of learning outcomes is not fully implemented.
5. Analyze the situation, especially identify obstacles, related to academic mobility, and find out how to support teachers to participate more in academic mobility.
6. In many cases, individual study course outcomes don’t correspond well to study programs’ learning outcomes. Consider a change in mapping: instead of mapping study programme learning outcomes to study course (and learning outcomes), map study courses to study programme outcomes. Also, consider applying Bloom’s Taxonomy or a similar framework when assessing how individual study outcomes contribute to and fulfill study programme learning outcomes. CDIO or similar educational framework (Conceive – Design – Implement – Operate) may be used to achieve better-interconnected courses/modules.
7. Increase the number of project-based courses, and group-learning-based courses where it is possible to attain soft skills through learning by doing.
8. Consider moving more theoretical courses to a more applied setting. For example, physics could be more related to computer science or be even primarily a computer science course with specific physics topics that are related to computer science.
9. Consider internships in groups, where companies get student groups that are working on some project that the company has provided. Consider creating student portfolios as part of their potential CV. For example, support and request creating git repositories with all student coding and project activities.
10. Consider more module-based courses, merging similarly themed courses to make room for more project-based and group-learning-based approaches and limit the number of courses that students have to learn in parallel to create more concrete specializations. Also, consult the industry and increase the number of courses where project themes or topics are provided by the industry.

Long-term recommendations

1. Analyze the situation related to gender imbalance among teaching staff with a special emphasis on the “glass ceiling” effect (women at higher positions) and prepare a long-term plan to attract more female professors.

II - "Intelligent Robotic Systems" ASSESSMENT

II - "Intelligent Robotic Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The name of the study program “Intelligent Robotic Systems” combines two key areas of Robotics and Artificial Intelligence which makes the study interdisciplinary. Combining study areas increases the study program’s coverage but at the cost of reducing the depth of coverage. The study program implementation is achieved through the cooperation of three RTU faculties. This approach is crucial for combining the maximum level of expertise to provide the course content. It is also a challenge to ensure quality and mutual cooperation across all faculties. The study program fits the study field and is in compliance with it.

2.1.2. According to the SAR, the program aims to prepare professionals who can be characterized by an ability to think systematically, to analyze, develop and implement technically and economically reasoned robotic and intelligent system solutions that promote the application of these solutions to ensure organizations' labor productivity increase and growth, as well as to develop the student's ability to carry out scientific work, to participate in local and international projects and to continue studies at Master and Doctoral study programs. The learning outcomes include the graduates being able to formulate specific problem in terms of automated and robotic systems, being able to develop solutions to particular problems by using modern automatic and electric drive elements, being able to develop an automatic or robotic system's control algorithm, being able to develop software for a specific robotic or automatic equipment management and coordination, being able to develop solutions that combine hardware and software technology advantages, knowing how to distinguish problems that should be solved with the hardware resources from those which should be solved with software resources, knowing how to identify problems that can be solved with intelligent robotic systems, being able to independently acquire new knowledge and skills, being able to work in group to achieve common goals, being able to substantiate the specific solution's advantages or disadvantages to the customer or to another professional, being able to provide compliance to professional and general ethic rules within their scope of authority and being prepared for their Master studies. The name of the program is “Intelligent Robotic Systems”, the degree awarded is “Bachelor of Engineering Science in Intelligent Robotic Systems”, the duration of the studies is 3 full years with 120 CP of studies. The study language is Latvian. Admission requirements are secondary education. Academic bachelor’s degree to be obtained, aims, objectives, learning outcomes, and admission requirements are consistent and justified.

2.1.3. The study program code has been changed to 43526 (“Other engineering sciences”). The code was 43481 and was changed because according to the current classification, the field of Computer Science is currently partially included in the field of computing (48) but the fields of robotics and artificial intelligence, which are at the core of this study program, cannot be included in computing (482 - computer applications, 483 - computer systems, databases and computer networks, 484 - programming). There is a question of whether the code classification system should be amended to include more categories so that not so many study programs in the study field would

be classified as other engineering sciences. Changes like the introduction of new courses, development of existing courses, changes of lecturers, and quality management of the program have been introduced in the reporting period.

2.1.4. The market trends for robotics are positive across all sectors which makes this study program highly relevant and gives it a positive outlook.
The student dynamics appear to be stable (73 - 2020/2021, 69- 2019/2020, 55- 2018/2019, 48 - 2017/2018) with a slight increase over the years which is positive and indicative of sustainability.
The number of graduates is small (7 - 2021, 3 - 2020, 5 - 2019, 9 - 2018). The number of graduates has slightly increased in the last reported year but could be further improved. Also, the overall graduation rate is very small.
The SAR pp. 396 mentions that: "In the process of obtaining the license for the program, support was obtained from the Association
of Mechanical Engineering and Metalworking Industries of Latvia, the Latvian IT Cluster, the Latvian Ministry of Defence and the Latvian Association of Computer Technologies. Currently, apart from the above-mentioned companies, which are the main providers of jobs for the program graduates (Ltd Asya and SIA Robotic Solutions, Ltd Playgineering, Ltd Giraffe are graduatefounded companies), automation companies such as ABB Latvija, Schneider, Peruza and others are active players in the labor market and jointly compete to attract study program graduates." Still, nor the SAR or the Annex in eplatforma.aika.lv contain any statistics on the graduate employement.

2.1.5. Not applicable.

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

The study program “Intelligent Robotic Systems” is an interdisciplinary study program that combines two key areas of Robotics and Artificial Intelligence. The program is compliant with the study field. The degree awarded is “Bachelor of Engineering Science in Intelligent Robotic Systems”, the duration of the studies is 3 full years with 120 CP of studies. Admission requirements are secondary education. Academic bachelor’s degree to be obtained, aims, objectives, learning outcomes, and admission requirements are consistent and justified. Changes like the introduction of new courses, development of existing courses, changes of lecturers, and quality management of the program have been introduced in the reporting period; and are justified. The economic justification of the study program is strong, but the graduation ratio is very low and there are no reported statistics on graduate employment.

Strengths:
1. Student dynamics are stable and indicate sustainability.

Weaknesses:
1. Very low graduation rate (and underlying retention rate).
2. No employment statistics are provided for the graduates.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The academic bachelor study program “Intelligent robotic systems” is provided as a 120 CP 3-year study program with a specialization in compulsory elective study courses in 3rd year (16 CP in total). 85 CP (according to 9th ANNEX) or 87 CP (according to self-assessment report pp. 400-401) are allocated to the compulsory study courses, 21 CP or 19 CP are allocated to compulsory elective

study courses, 4 CP are allocated to free elective study courses and 10 CP are allocated to Bachelor's Thesis.
According to the self-assessment report, the compulsory study courses cover industry guidelines, principles, structure, and methodology (25 CP), study courses devoted to the history of the field development and relevant problems (10 CP), and study courses devoted to characterization and intersectoral issues of the sector (15 CP) and courses in Innovative Product Development and Entrepreneurship 4 CP and Civil Defence (1 CP) and Environment and Climate Roadmap (1 CP). The rest of the compulsory study courses are divided into two groups: Field-specific theoretical basic study courses (39 CP) and IT study and Field-specific professional study courses (14 CP). Most of the courses are field-specific, but some courses are shared between multiple study programs in RTU, for example, Fundamentals of Computer Graphics and Image Processing. Field-specific theoretical basic study courses cover topics basics in Electronics and Robotics, programming, and Intelligent control systems. Field-specific professional study courses cover topics of in-depth knowledge of robotics.
The compulsory elective courses consist of field-specific study courses 16 (CP), Humanities and social sciences study courses 2 CP, and Languages 3 CP. 15 different field-specific study courses offer two specializations: Robotic hardware and Robot control. Humanities and social sciences study courses are related to sociology or politology and are joint study courses, thus not much interconnected to IT. Languages course a) is not required by law or regulations of the Minister Cabinet nor is complementary to the field of study.
Overall, the content of the study program is topical, the content of the compulsory study courses in Field-specific theoretical basic study courses and IT study and Field-specific professional study courses, and the compulsory elective courses and Field-specific study courses generally are well interconnected and complementary, and correspond to specific industry needs. However, the compulsory study courses of Mathematics and Physics are joint study courses for many different study programs and may lack interconnection to specific IT applications. CDIO or similar educational framework (Conceive – Design – Implement – Operate) may be used to achieve better-interconnected courses/modules. Compulsory elective study courses (B2) in Humanities and social sciences contain very general topics and are not customized for the study program or the learning outcomes.

2.2.2. Not applicable

2.2.3. Various methods are used to achieve the aims of the study program: lectures or practical classes, group work, or independent work (both at home or in the laboratory). There is circumstantial evidence that student-centered learning methods are sometimes used. Also, students have access to prototyping laboratories for the design and development of robotics systems starting from the first semester. Group work is supported by several courses and student collaboration within a group is also encouraged. To support students and the implementation of learning methods students have access to modeling software systems, different equipment, laboratories, and virtual solutions which are relevant to industry needs. Students also have opportunities to participate in research (in some cases the study program offers part-time work in specific research projects).
Specialized courses with 3 or 4CP that allow the development of theoretical knowledge and acquisition of practical skills are a good start. However, the project-based and group-learning-based approaches to allow the development of soft skills and further enhance student-centered learning are somehow limited as there are a lot of courses that students have to learn in parallel. Student-centered learning is further limited by the large overlap of courses with study programs "Computer Science" and "Information Technologies":

Overlap with "Information Technologies":
Mathematics 9 CP

Discrete Mathematics 3 CP
Probability Theory and Mathematical Statistics 2 CP
Random Processes 2 CP
Numerical Methods 2 CP
Physics 6 CP
= 24 CP
Discrete Structures of Computer Science 2 CP
Data Structures 3 CP
Algorithmization and Programming of Solutions 6 CP
Object-Oriented Programming 3 CP
Introduction to Computer Architecture 3 CP
Basics of Computer Control 3 CP
= 20 CP
Fundamentals of Computer Graphics and Image Processing 2 CP
Fundamentals of Artificial Intelligence 3 CP
= 5 CP
Innovative Product Development and Entrepreneurship 4 CP
Languages 3 CP
Humanities and social sciences study courses 2 CP
= 9 CP
= 24 + 20 + 5 + 9 = 58 CP out of 110 CP
Such overlap of study courses, including what would be large-scale classrooms (up to 300 students) limits individualized, or study field-specific approaches, where even theoretical knowledge can be learned already with the field-specific application (e.g. learning programming on a robot or similar).

2.2.4. Not applicable

2.2.5. Not applicable

2.2.6. During the reporting period (from 2013/2014 to 2020/2021), 50 Bachelor students defended their Bachelor's Thesis. The main themes of the bachelor thesis have been robot control - 23%, robot-human interaction, automation, machine learning (with application in robotics) - 26%, artificial intelligence (with application in robotics) - 23%, sensor data processing - 18%, software development (may not be directly related to robotic systems). These topics are relevant to the field and have been on par with industry trends.

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

Conclusions
Overall, the content of the study program is topical and relevant to the needs of the industry and most of the students and graduates have no problem entering the industry. However, the content of the study courses could be better interconnected and more complementary. Often individual study course outcomes don’t correspond well with the study programs’ learning outcomes. Some general elective courses are shared with many other study programs, which also limits the ability to use some student-centered learning approaches and methods. Also, both students and industry partners highlight the lack of soft skills in graduates. Topics of defended Bachelor Theses are relevant to the field and have been in part with industry trends.

Strengths:
1. Field-specific theoretical basic study courses and IT study and Field-specific professional study

courses, and the compulsory elective courses and Field-specific study courses generally are well interconnected and complementary and correspond to specific industry needs.
2. Students have access to prototyping laboratories for the design and development of robotics systems starting from the first semester. Students have access to modeling software systems, different equipment, laboratories, and virtual solutions which are relevant to industry needs.

Weaknesses:
1. Project-based and group-learning-based approach to allow the development of soft skills and further enhance student-centered learning is somehow limited as there are a lot of courses that students have to learn in parallel.
2. The compulsory study courses of Mathematics and Physics are joint study courses for many different study programmes and may lack interconnection to specific IT applications.
3. The same course achieves different learning outcomes or different levels of learning outcomes in different study programmes (even when considering the different fields of study) - just as an example MFZ101 in 43526 - Information Technologies and 43526 - Intelligent Robotics System.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the excellent implementation of the bachelor study program “Intelligent Robotic Systems”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
The study program is sustained mostly by The Faculty of Electrical and Environmental Engineering as the most important contributor, providing the necessary measuring equipment and visual learning aids for the study process, in particular Siemens industrial automation laboratory, motor control equipment, etc. Special equipment available to students is a Baxter robot, Pepper robot, ABB IRB 1200/ 1600 robots, CNC and laser cutting equipment, 3D printers, SMD assembly line, prototyping room, and Measuring equipment. It should be noted that the program involves the use of a special hardware infrastructure (robotics), which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the robotic platforms.
According to the SAR pp. 414, the bachelor study program “Intelligent Robotic Systems” has an equivalent allocation of some 28 state-funded seats per year, with an own budget of some 121k euros/year (which does include a small number of tax-paying students). This seems to be sufficient

for sustaining the number of enrolled students.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility of ensuring a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable.

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the bachelor study program “Intelligent Robotic Systems” has an equivalent allocation of some 28 state-funded seats per year, with an own budget of some 121k euros/year (which does include a small number of tax-paying students). Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability. The current program has on average over 20 students enrolled in the first year (on average over the 10 years, according to SAR pp. 398).

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) such that the bachelor program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program's implementation. It should be noted that the program involves the use of a special hardware infrastructure (robotics), which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the robotic platforms.

Strengths:
1. The access to scientific literature is comprehensive; there are good logistics (equipment, renovated buildings).

Weaknesses:
1. The planning for the continuous upgrade of robotic platforms (and other hardware) is not considered and assessed financially.

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 provisions are sufficiently met to insure the achievements of the learning outcomes

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report (pp. 415-416) and in the Annexes to SAR submitted for evaluation, the teaching staff of the academic bachelor study program “Intelligent Robotic Systems” lists 4 Professors, 2 Assoc. Professors, all of them holding a doctoral degree (in Engineering or Economics). The total number of teaching staff involved in the program is not explicitly mentioned, although further in the SAR pp. 417 it is mentioned that "The total number of academic staff as well as the distribution of qualifications did not change significantly during the reporting period, with 13 professors, 6 associate professors and 1 assistant professor being involved in program implementation." The study program is implemented for less than 250 students. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

2.4.2. As presented in the Self-Assessment Report (the teaching staff of the program at the previous evaluation is not mentioned), the teaching staff of the bachelor program “Intelligent Robotic Systems” has not changed significantly with respect to the previous evaluation. Currently, there are a total of 13 professors, 6 associate professors, and 1 assistant professor. The total number of academic staff is declared as 20, which is rather a small number for a bachelor-level program; we suspect that the Self-Assessment Report does not list the entire teaching staff of the program.
As observed in 2.4.6, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report (pp. 94, criterion 2.4.4. for the study field), “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (page 419) does not mention specific information about publications of all the teaching staff involved in the program (although these publications exist, as explained in the presentation of the key teaching personnel, presented on pages 416-417). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related

to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU, access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 20 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) toward successfully implementing the study program.

Strengths:
1. The teaching staff shows a good mix of academic and applied experience, with good research results.

Weaknesses:
1. Limited documentation within the SAR of all the teaching staff (listing, research).
2. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.

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

There is full compliance of the teaching staff with the conditions and requirements of the 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

P06_3.2.1_DBR0(43526)_CompliancewiththeStateEducationStandard_AkadBak_ENG.pdfconfirms that the study program complies with Cabinet Regulations No. 240 of 13 May 2014 “Regulations

on national academic education standards”

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 (A10_DBR0(43526)_StudyCoursesdescr_ENG.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (P28_DBR0(43526)_DiplPielik_LV_DiplSupplemt_ENG.zip)complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Confirmation - on compliance of the academic staff.edoc) and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic bachelor study “Computer Systems”

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 program is fully compliant with the requirements.

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

The study program complies with the study field. The title, code, degree to be obtained of the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. Student dynamics are stable, but student retention should be improved. Overall, the content of the study program is topical and relevant to the needs of the industry and most of the students and graduates have no problem entering the industry. However, the content of the study courses could be better interconnected and more complementary. Often individual study course outcomes don’t correspond well with the study programs’ learning outcomes. Some general elective courses are shared with many other study programs, which also limits the ability to use some student-centered learning approaches and methods. The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the bachelor program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program's implementation. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

Strengths:
1. The access to scientific literature is comprehensive; there are good logistics (equipment, renovated buildings).
2. The teaching staff shows a good mix of academic and applied experience, with good research results

Weaknesses:
1. Student retention can be improved
2. Project-based and group-learning-based approach to allow the development of soft skills and further enhance student-centered learning is somehow limited as there are a lot of courses that students have to learn in parallel.
3. Limited documentation regarding the teaching staff and their institutional cooperation within the program

Evaluation of the study programme "Intelligent Robotic Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Intelligent Robotic Systems"

Short-term recommendations

6. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.

7. Consider the implementation of a mentoring/ tutoring mechanism for all the students based on the implication of the teaching staff.
8. Consider implementing a consistent plan for the reduction of the student drop-out rate.
1: Increase the number of project-based courses, and group-learning-based courses where it is possible to attain soft skills through learning by doing. Consider more module-based courses, merging similarly themed courses to make room for more project-based and group-learning-based approaches and limit the number of courses that students have to learn in parallel. Consider creating student portfolios as part of their potential CV. For example, support and request creating git repositories with all student coding and project activities.
2: Consider moving more theoretical courses to a more applied setting. For example, physics could be more related to computer science or be even primarily a computer science course with specific physics topics that are related to computer science. CDIO or similar educational framework (Conceive – Design – Implement – Operate) may be used to achieve better-interconnected courses/modules.
3: Consider a change in mapping: instead of mapping study programme learning outcomes to study course (and learning outcomes), map study courses to study programme outcomes. Also, consider applying Bloom's Taxonomy or a similar framework when assessing how individual study outcomes contribute to and fulfill study programme learning outcomes.

Long-term recommendations

1. Increase the number of courses where project themes or topics are provided by the industry.
2. Consider the documented mechanisms of teaching staff cooperation toward program implementation.
3. Communicate research opportunities to students earlier in their studies and make them more systematic.
4. Consider creating a system, where systematic issues with study program and study courses can be followed up and raised in severity and importance if they persist through the years.

II - "Telecommunication Technologies and Data Transmission Engineering" ASSESSMENT

II - "Telecommunication Technologies and Data Transmission Engineering" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. According to the self-assessment, the study program is implied (not stated clearly) to be in compliance with the study field. In the SAR page 283, it is stated that the aim of the study program is to provide students with the acquisition of theoretical knowledge and research skills in the field of engineering, which is based on theoretical principles in the fields of telecommunication technology and data transmission. This goal is aligned with the study field's topic area. The study program is suitable for the study field.

2.1.2. The code of the study program is 43526 (which according to Latvian Education Classification

(Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `43` notes that this study program is academic bachelor study program and the last three digits `526` indicate that this study program is related to the educational group of "other engineering sciences).
A common question for many study programs in the study field is whether it might be possible to amend the classification codes so that the study programs in the field could be classified into a more descriptive category. The problem is that if most or all study programs are classified as "other" then this is indicative that the current categories are not sufficiently accommodating. For example, if there would be a classification category "Telecommunication Technologies" then this study program would fit there perfectly and be very descriptive instead of the current "Other Engineering Sciences".
The degree awarded is a Bachelor's Degree of Engineering Science in Telecommunication Engineering.
The objective of the study program is to provide the acquisition of theoretical and research skills and prepare specialists.
According to the SAR page 285, the outcome of the study program is graduates who know the basics of fundamental sciences necessary for the acquisition of theoretical study in the field. The graduates manage the content of basic study courses in the telecommunication and data transmission sub-sector at the level necessary for the acquisition of specialized study courses and innovations in the field. The graduates know a level of understanding: of telecommunication and computer networks, main technologies and standards, principles of operation of telecommunication networks and systems, data transmission systems and their main concepts, basics of operation of telecommunication equipment and networks, and measurement methods. Additionally, they are able to work with scientific, technical, and methodological literature available in a foreign language and are able to use theoretical knowledge to formulate and solve specific tasks in the telecommunication and data transmission sub-sector. They are able to perform experimental data processing in the analysis of the features of the operation of telecommunication and data transmission systems and are able to develop applications and algorithms for solving specific tasks. The graduates are able to systematize related information, summarize, interpret and analyze the results of measurements and calculations, prepare summarized reports, and present them. They are able to apply current technologies and software in the process of designing telecommunication and data transmission systems. They are able to perform an analysis of the situation regarding current problems in telecommunication data transmission systems and their solutions, based on the study of literature and information available on the Internet. They are able to perform diagnostics of telecommunications networks and equipment, and evaluation of the main operating parameters. Finally, they are able to work individually and in a team, to continue learning and educating in the field of telecommunications and data transmission systems, and to act in a sustainable, ethical and responsible manner so as not to cause harm to society and the environment.
The duration and scope of the study program implementation as well as the implementation language are reasonable and justified. The duration of the study is 3 full years. The languages of implementation are Latvian and English. The scope of studies is 120 CPs.
The admission requirements are declared in the SAR on page 286. The students eligible for enrolment are required to have general secondary or vocational secondary education and English language proficiency equivalent to at least CEFR B2 level.
The title, code, degree to be obtained, aims, objectives, learning outcomes, and admission requirements are interrelated.

2.1.3. Multiple changes have occurred within the study program (as detailed in SAR pages 287-288). There is a new study program director. The volume of the study has been changed from 122 CP to

120 CP. The title of the program is changed from “Telecommunication” to “Telecommunication Technologies and Data Transmission Engineering”. The classification code was changed to 43526 (“Other engineering sciences”). The code classification question exists for numerous programs in the study field: if so many programs do not fit into regular classification codes, perhaps the classification system needs to be amended with some codes to accommodate the programs in the field. The volume of the compulsory part has decreased from 86 CP to 77 CP. The volume of the compulsory elective part has increased from 22 CP to 29 CP. The changes have been made after taking into account the recommendations from enterprises and graduates. This approach is commendable. The changes are analyzed, justified, and supported by the expert team.

2.1.4. According to the SAR (pages 291-292), the telecommunication field in Latvia is stable and the indicators seem to indicate growth. The economic justification of the program is based on the research performed and the employment of the graduates. Employment of the graduates shows the need for specialists prepared in the study program in the labor market. About 80% of the graduates already worked in parallel with their studies. The admission into the study program shows a declining trend which should be analyzed in more detail at a wider level to establish whether there are higher-level systematic causes also affecting the admission statistics. Exmatriculation due to academic failure is relatively high (67 per year on average). According to the self-assessment, this is caused by insufficient preparedness for successfully finishing Mathematics and Physics courses.

2.1.5. Not applicable

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

Conclusions
The study program complies with the study field.
The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation and the implementation language are sufficiently reasonable and justified.
The corrections made to the study program’s parameters within the assessment of the study field are sufficiently analyzed, and justified, and would be supported.
Economic and/or social justification of the study program, dynamics of the number of students, and employment indicators of the graduates of the study program are sufficiently reasonable.

Strengths:
1. Changes are being made to ensure a better fit of the program to changing needs of the industry, which is very positive. The changes in compulsory and compulsory electives are also more supportive of the student-centric approach.

Weaknesses:
1. Student dynamics indicates a declining number of new students which needs to be analyzed further. The recommendation is to analyze why the number of students is declining by comparing it to the statistics of the field in general and conducting surveys with students.
2. Academic failure due to mathematics and physics courses is a concern. The recommendation is to address it with more assistance measures and support to students.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR)

pp. 294-298) and the Annexes to it, and in the interviews conducted during the visit as well. The program aims to provide students with theoretical knowledge and research skills in the fields of telecommunication technology and data transmission and to prepare innovative-minded specialists focused on the introduction of new technologies and knowledge with internationally competitive academic education. The aims and the implementation of the program are formulated based on surveys of the needs and requirements of stakeholders (potential employers, universities, students, society, and scientific institutions). The anticipated volume of compulsory courses in the program is 77 CP. These courses develop students' knowledge and skills in the fields of telecommunication technologies and data transmission engineering and they also improve knowledge and skills in scientific research methods and their application thereof. The compulsory elective (specialization) courses of the study direction (24 CP) aim to enable potential students to deepen their knowledge in the chosen specialization field. There are also humanitarian and social sciences courses included in the program (2 CP), language courses (3 CP), as well as free optional courses (4 CP). The program finishes with a bachelor's thesis (10 or 15 CP).
The program has been offered for more than 25 years and it is continuously developing, so as to maintain its relevance. The content of the program is updated according to the tendencies and developments in the field, the labor market, and research results. Each year the program is updated, taking into account the results of student surveys as well as recommendations from employers and graduates.

2.2.2 Not applicable

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 298-301) and the Annexes to it, and in the interviews conducted during the visit as well. The program is implemented in the form of lectures, laboratory work, and practical classes, reserving significant time for independent study. Lecture courses are generally theoretical, where research elements are embedded for students in the form of theses, research, and other independent works. The orientation of practical classes is individual, where within the common topic each student elaborates on an individual study project. Various methods are used: lectures, seminars, presentations, group works, discussions, situation analysis, solving practical tasks to strengthen knowledge, and control tests - to test knowledge. In order to inform students about the latest trends in the industry, guest lectures by industry experts and company representatives are held regularly. Acquisition of knowledge, skills, and competencies in special subjects is monitored in the form of individual consultations. Attendance of practical classes is compulsory for all students during the whole period of studies. A description of independent work is included in the description of the course as a compulsory component. The ability of students to learn independently is purposefully developed in all courses. Students acquire practical and research work skills by regular use of literature and Internet resources, including international scientific databases, which are available at the RTU library with electronic access to the ORTUS environment, in order to successfully elaborate research papers.
In order to ensure student-centered education, students are offered a relatively high degree of autonomy in the development of independent work, implementation of specific undergraduate paper research, and the choice of a particular major, as well as in group work, which to a large extent also allows the manifestation of organizational skills, leadership qualities, and other transdisciplinary skills.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 301-305) and the Annexes to it, and in the interviews conducted during the visit as well. Topics of the student's bachelor's theses are offered by the staff of the program, the RTU ETF Institute of Telecommunication, and can also be chosen independently by the students, according to their own interests, following consultation with the teaching staff. The objective of the bachelor thesis is to demonstrate and assess the student's ability to perform scientific research work in the field of telecommunications and the ability to use analytical, mathematical, optimization, and modeling methods for solving problems, based on the scientific literature.
The SAR includes a list of all bachelor's theses topics in the period of the evaluation. These are all relevant to the field and to the content of the program.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' final theses are relevant to the field and correspond to the study program.

Strengths:
1. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The teaching and learning methods employed are student-centered.
5. The topics of the bachelor's thesis are relevant to the program.

Weaknesses:
1. Student-centered teaching and learning approaches are not employed in full.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.

RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
The program is mostly supported by RTU FET Institute of Telecommunications. The program is implemented in the FET building on Āzenes street 12, Riga.
The program uses FET labs, such as Electrical Measurements Student Laboratory, Transmission Systems, and Access Networks Student Laboratory, Telecommunications Theory Measurement Student Laboratory, Digital Devices and Systems Student Laboratory, Digital Electronics and Computer Architecture Student Laboratory, Transmission Media Student Laboratory, Class of Communication Systems and Telecommunication Networks Mathematical Modelling, Transport Network Performance Assessment and Radio Navigation Laboratory, Transport Electronics Laboratory. However, some labs are rather small and are not easy to access for first-year students.
According to SAR (section 3.3.3) the program is mostly funded by the state (137 seats). From 2013 the funding diminished from 702 385 Eur to 590 264 Eur (however, after a drop in 2015/2016 489 787 Eur it rebounded and grew). The program has been sustainable, improving over the last 5 years.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of tstudents in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The FET Institute of Telecommunications with sufficient resources allocated well supports the program.

Strengths
1. Good program provision - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses
1. Some laboratories have limited access to younger students.
2. Students of this program do not have access to EDUROAM, in contrast to all other students of the RTU.
3. Student of this program do not have access to the most computational resources, which other students have.

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 provisions are sufficiently met to ensure the achievement of the learning outcomes. Labs and computational resource should be made more accessible to all students.

2.4. Teaching Staff

Analysis

2.4.1. The qualification of the teaching staff members involved in the implementation of the study program complies with the requirements stated by the relevant laws for the implementation of the study program and it serves as a basis for the achievement of the aims and learning outcomes of the study program and the relevant study courses.
In the SER 3.4.1. it is stated that the qualification of the teaching staff involved in the implementation of this academic bachelor study program fully corresponds to the study program implementation conditions and requirements of the normative acts, providing achievement of the corresponding study program and study course objectives, tasks, and study results.
In the implementation of the Academic bachelor study program “Telecommunication Technologies and Data Transmission Engineering” 9 professors, 7 associated professors, 14 docents, 14 lecturers, 4 researchers, and 3 assistants/scientific assistants are involved in total.
The teaching staff is selected according to (1) their knowledge of the study field; (2) their pedagogical skills; (3) their experience in teaching foreign students in English. In the SER 3.4.1. methodological seminars for teaching staff are emphasized.
According to the assessment visit insights development of pedagogical competencies is considered too narrow (related mostly to new technology and e-learning) lacking learning design and student-centered teaching and learning approaches based on learning outcomes applications. Namely, the information provided in the SER 3.4.1 states that one of the three criteria for selection of the teaching staff is pedagogical skills corresponding to the modern trends in the field, which is the adequate criterion. But during the assessment visit, it was not provided any reference that training for developing teachers’ skills for a student-centered approach is organized.

2.4.2. According to the SER 3.4.2. the RTU and the institute/faculty purposefully take measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation.
Both academic teaching staff and qualified experts from various fields are involved in the implementation of the study program.
Two-thirds of all the teaching staff are professors of RTU FET Institute of Telecommunications and one-third are from other structures.
As stated in the SER 3.4.2., the academic staff involved in implementation performs scientific research at the international level by improving their own qualifications and performing scientific and research activities.
In the reporting period, elections of new content and associated professors have taken place and new experts have been employed. Almost in all groups of the teaching staff the average weighted age of the academic staff decreased.
There has been the regular involvement of master’s students and master’s study graduates and doctoral students in the study process. It has been supported by the implementation of ESF project SAM which also may contribute to the attraction of foreign academics and the improvement of the

competencies of the existing staff.
The academic staff is stable and regularly participates in various events related to improving qualifications.

2.4.3. Not applicable

2.4.4 Based on the information provided in the SAR and the Annexes to it, the CVs of the members of the teaching staff, and the interviews conducted during the assessment visit as well we can conclude that all the members of the teaching staff mentioned in the SAR as being involved with the implementation of the program are active in research (publications and projects) and have published in peer-reviewed journals/conferences during the last six years.
Namely, according to SAR 3.4.1, one of the three primary criteria for selection of the teaching staff is knowledgeable about the newest technologies and participation in scientific and research projects in their fields.
Further, in SAR 3.4.1 it is also stated that the qualification of all members of the teaching staff corresponds to the implementation conditions and the normative acts of the study program which is proven by their qualification and curricula vitae.

2.4.5. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has been established, it ensures the achievement of the aims of the study program and the interconnection of study courses within the study program.
It is reported in SAR 3.4.5. that mutual cooperation among the teaching staff is done within the study program, starting from planning of the study year and reconciliation of the study course project tasks at regular methodological seminars, and continues within the whole semester through teaching the training courses, planning the necessary changes for each semester and for the program in general.
Various cooperation channels were mentioned such as online conference platforms, e-learning environments, councils, and annual seminars.
The study courses of the program are regularly improved, based on both - recommendations from students and tendencies of the field as well as discussions and analysis of the teaching staff.

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

Conclusions
The qualification of the teaching staff members involved in the implementation of the study program complies with the requirements stated by the relevant laws for the implementation of the study program. But pedagogical competencies of teaching staff are considered too narrow.

The number and composition of academic staff are stable and they regularly take part in various events related to the improvement of qualifications. But a long-term plan for staff attraction and development is not reported to exist.

Mutual cooperation among the teaching staff is done within the study program and is related to all stages of program planning and delivery.

Strengths:
1. Qualification of the teaching staff involved in the implementation of this academic bachelor study program corresponds to the study program implementation requirements and with the normative acts.
2. Academic teaching staff and qualified experts from various fields are involved in the

implementation of the study program.
3. Provision of the methodological seminars for teaching staff as well as the use of ESF project to improve the teachers' competences
4. Mutual cooperation among the teaching staff within the study program is supported by different channels and mechanisms.
5. Teaching staff, among other stakeholders, participated in the regular study program improvements

Weaknesses:
1. Lacking regular opportunities for professional development in learning design and student-centered teaching and learning approaches based on learning outcomes applications.
2. The situation with teaching staff is reported as stable but the mid-term and long-term plan for staff attraction and development is not reported to exist (it will be helpful).

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

All standards are met and there are no major shortcomings. Minor weaknesses are related to the lack of professional development in student-centered approaches and the plan of staff development.

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 Annex P06_3.2.1_EBG0(43526)_AtbilstibaValstsStandartam_AkadBak_LV.pdf describes the correspondence of the program to "Cabinet Regulation No. 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

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 Annex (P10_EBG0(43526)_StudijuKursuapraksti_LV.zip) provides the required description of all courses of the program both in Latvian and in English. Descriptions comply with regulations

set forth in 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 Annex P28_3.1.2_EBG0(43526)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognized documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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 Annex Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) provides the information that at least five professors and associate professors take part in the implementation of the compulsory part and the limited elective part.

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

Clause has been removed from law as of 14.07.2022.
Still, there are less than 250 full-time students in the program, and the report (Nr_37_RTU_bk_250_stud.edoc) provides confirmation of a relevant opinion of the Council of Higher Education, as well as information that at least five professors and associate professors who take part in the implementation of the compulsory part and the limited elective part.

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

Attached resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation.. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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 report (annex P15_2.1.4_StudijuTurpin_StudyContinue.zip for the field) provides information that the student can continue studies in RTU professional bachelor study program "Smart electronic systems"

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 report (annex P06 for the program) describes the correspondence of the program to "Environmental Protection Law", and "Civil Protection Law"

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

All the requirements are satisfied

General conclusions about the study programme, indicating the most important strengths

and weaknesses of the study programme

The title, code, degree to be obtained of the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market's needs regarding technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The FET Institute of Telecommunications with sufficient resources allocated well supports the program. The qualification of the teaching staff members involved in the study program implementation complies with the requirements stated by the relevant laws for the study program implementation. The pedagogical competencies of teaching staff are considered too narrow.

Strengths
1. The program meets the needs of the labor market.

Weaknesses
1. The pedagogical competencies of teaching staff are considered too narrow.

Evaluation of the study programme "Telecommunication Technologies and Data Transmission Engineering"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Telecommunication Technologies and Data Transmission Engineering"

Short-term recommendations

1. Provide opportunities for regular professional development of teachers in learning design and student-centered teaching and learning approaches based on learning outcomes applications.
2. Considering the preparation of the mid-term and long-term plan for staff attraction and development will be useful.
3. Collect evidence if student-centered teaching and learning methods have been employed in all courses.
4. Labs should be easily accessible to first-year students as well.
5. Ensure access for the students of this particular program to EDUROAM.
6. Ensure access for the students of the program access to the same resources as all RTU students.

Long-term recommendations

1. Recommendation is to analyze why the number of students is declining by comparing it to the statistics of the field in general and conducting surveys with students.
2. Academic failure due to mathematics and physics courses is a concern. The recommendation is to address it with more assistance measures and student support.

II - "Smart Computer Technologies" ASSESSMENT

II - "Smart Computer Technologies" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The contents of the study program “Smart Computer Technologies” (43526) (study program) is oriented to information technology, computer science, telecommunications, and computer control, as it focuses on computer graphics and computer vision, computer control, and computer networks. (SAR, p. 900) Most of the courses of the program (Annex P09_3.2.1_DBF0(43526)_Plans_lv_Plan_eng.pdf) cover topics of ICT.

2.1.2.
The title of the study program is Smart Computer Technologies.
The code of the study program – 43526 which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `43` notes that this study program is academic bachelor program and the last three digits `526` indicate that this study program is related to the educational group of “other engineering sciences”.

The degree to be acquired: Bachelor's Degree in Engineering Science in Smart Computer Technologies.
The 7 tasks (objectives) of the program correspond to the goal to prepare qualified specialists with higher education in computer vision, computer control, and computer networks who can create and maintain smart computer technologies solutions for solving various automation and visualization problems.
The results of the study program (learning outcomes) are adequate (9 outcomes) for the academic bachelor's degree and comply with the aim and objectives of the study program. Learning outcomes include both theoretical knowledge and practical skills and competencies in smart computer technologies, as well as the ability to analyze and communicate things.
Admission requirements (general or vocational secondary education) comply with the state regulations, where persons with secondary education can apply for the study program "Smart Computer Technologies".
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (1 implementation variant) –
Full-time studies with a duration of 3 years (120 CP/180 ECTS) implemented in the Latvian language.
Study volume, duration, and implementation form are reasonable and justified.

2.1.3. New study courses introduced, e.g., “Embedded Systems”, “Internet of Things Technologies”, “Graphics in Smart Technologies”, “Fundamentals of Security in Computer Technologies”, “Interactive Computer Graphics” (SAR, p. 899).
The process of developing Bachelor papers has been unified within the faculty.
The classification code was changed to 43526 (in accordance with Latvian Republic Cabinet Regulations No. 322 of 13 June 2017).
, and the degree was changed to Bachelor of Engineering Science in Smart Computer Technologies
The volume of the study program was changed from 122 CP in 2013 to 120 CP in 2018 (in accordance with Cabinet Regulations, No. 240 of 13 May 2014, “Regulations on the State Academic Education Standard”). (SAR, pp. 899, 900)
The changes made are reasonable and justified for the program's evolution.

2.1.4. Graduates of engineering sciences, computer network engineers, computer graphics and image processing specialists, industrial automation specialists, and robotics specialists are in wide demand in the labor market, as can be seen from the advertisements. (SAR, p. 902)
Graduates of the study program work in well-known companies (e.g., Accenture, Evolution gaming) as IT consultants, application software developers, programmers, computer network administrators, system administrators, testers, and automation engineers. As of 2018, the average income of graduates already in the first year after graduation is 22% higher than the average salary in the country, but two years after graduation - 37%. (SAR, p. 902)
According to Annex P05_3.1.4_DBF0(43526)_StatistikaparStud_LV_StatisticsonStudents_ENG.docx, in recent years, the annual number of admitted students is 98-120, making the total actual number of students in the program 231-257, whilst the annual number of graduates is 20-25 with two exceptions - 13 in 2018/2019 and 38 in 2014/2015, thus indicating a high drop-out rate up to 80%.
Most of the students are state-funded (~95% as of 2020/2021, but even more previously).

2.1.5. Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are more specialization-focused and are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from high school.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.

Weaknesses:
1. Very high drop-out rate.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 904-907) and the Annexes to it, and in the interviews conducted during the visit as well. The aim of the study program is to educate and train qualified specialists with higher education in the field of computer graphics, computer vision, computer control, and computer networks, who are able to select, create, integrate, use, implement and maintain user-friendly intelligent computer solutions for companies and organizations. These subjects are very relevant, timely, and important. The volume of the study program is 120 CP, and the duration of studies is 3 years. In the first and second years of study, the academic bachelor study program is the same for all students of the FCSIT, but in the third year, students study subjects offered within the program they follow. The program complies with national regulations.
Upon completion of the study program, the student obtains a Bachelor’s degree in the field of Smart Computer Technologies.
The study program consists of compulsory study courses, or Part A (82 CP), compulsory elective

study courses, or Part B (24 CP), free elective study courses, or Part C (4 CP), and Bachelor Paper (10CP). The compulsory part of the study program includes the guidelines, principles, structure, and methodology of the respective branch and sub-branches of the relevant scientific domains. Subsequent courses go deeper into the respective fields. A formal process for making changes to the course content exists; this is complemented by informal processes, e.g. teaching staff collaboration. Even though the concept of learning outcomes and how they are/should be assessed does not seem to be fully understood or appreciated by the students, the combination of formal and informal processes and the practices above provide a sufficient guarantee that the desired learning outcomes will be eventually achieved.
However, the relevance and usefulness of the extent and content of the general scientific knowledge (e.g. math, physics) acquired during the first two years of study with the current program design should be re-considered, in light also of the need to make room for additional topical subjects.
The study program is implemented in the mode of full-time in-person studies in Latvian. It complies with the requirements stipulated by the pertinent regulations, and with the basic principles of the organization of studies at RTU. Collaboration with industry and the relevant stakeholders in the labor market is very good, by means, for example, of continuous informal interaction regarding the content of the program.
However, there is no formal, regular, systematized venue for enabling such collaboration when it comes, for example, to input or feedback on the academic content of the subjects offered in the study program.
Nevertheless, according to the employers' representatives that the expert group met during the assessment visit, the study program meets their needs. The most frequent concern expressed was the lagging of soft skills (e.g., communication skills, team working, etc.) among the graduates. This is perceived by the industry as a weakness of the graduates.

2.2.2 Not applicable

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 907-910) and in the interviews conducted during the visit. To achieve the study results, hybrid teaching methods are used, which combine verbal teaching methods, explanatory teaching methods, interactive teaching methods, as well as demonstrative teaching methods. These teaching and learning methods are used in the implementation of the study program and are adapted by the academic staff to the specific situation. Students have the opportunity to receive individual consultations from the academic staff involved in the study program, including communication in the e-environment using RTU licenses for Zoom and MS Teams platforms, as well as messaging services of the Moodle platform.

Various types of feedback are actively used during lectures, including using modern IT solutions, such as student survey tools (for example https://quizizz.com/), which also serve to implement emotional stimulation and recognition methods. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 911-914) and the Annexes to it, and in the interviews conducted during the visit as well. The topics of the graduation papers are suggested considering the trends in the world and the Latvian labor market. Companies (Accenture, Apply, etc.) are also involved in formulating topics, by

proposing such topics of interest to them to the program. The topics are addressing different areas, such as industrial computer vision, industrial automation, medicine, and health care, education.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' final theses are relevant to the field and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall study program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The study program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The topics of the bachelor’s theses are relevant to the study program

Weaknesses:
1. The relevance and usefulness of the extent and content of the general scientific knowledge (e.g. math, physics) acquired during the first two years of study with the current program design are not self-evident.
2. There is no formal, regular, systematized venue for enabling collaboration with industry and the labor market when it comes, for example, to input or feedback on the academic content of the subjects offered in the study program.
3. The graduates’ soft skills are insufficient.
4. Student-centered teaching and learning approaches are not employed in full.

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

Not relevant

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
The studies take place in the new or renovated buildings in RTU Ķīpsala Campus.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It

offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by state and local student fees (90 state-funded budget seats). From 2013 to 2021 funding was between 368 166 to 503 929 Euro per academic year. The funding is constantly growing since 2015/2016 and is sufficient to support the program.
Experts consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. A number of the students in the study program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well-provisioned, and funding is growing.

Strengths
1. Good provision of the study program - new or renovated buildings, well-equipped laboratories, and a library.
2. Programme is well funded and funding is constantly growing..

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 provisions are sufficiently met to insure the achievement of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. According to the SAR (p. 920), the total number of teaching staff in the study program is mentioned as 73, though this number has no direct evidence in the report. Annex P19_2.3.7_Macibspeki_LV_AcademicStaff_ENG.xlsx lists 24 members of teaching staff (including 20 doctors) involved in the implementation of the study program. The brief summary of the academic staff (p. 921) lists 13 persons (including 4 with doctoral degrees), 5 of them can be found in Annex P19_2.3.7_Macibspeki_LV_AcademicStaff_ENG.xlsx.
According to the SAR (p. 920), all main instructors responsible for leading courses of the study program are doctors (in total, 20 doctors). All academic staff members who deliver lectures have at least a Master's degree in engineering or computer science, while practical and laboratory work is mostly supervised by instructors holding a Master's degree.
Visiting lecturers are also extensively attracted (9 lecturers), e.g. from Ltd Colla, and ABB Latvia.
The qualification of the teaching staff is fully compliant with the requirements of the study program.

2.4.2. The most important changes (SAR, pp. 923-925) are related to the replacement of older instructors with new specialists. As information technologies are developing rapidly, the attraction of new academic staff has encouraged the introduction of new courses to modernize the study program.
Several lecturers left for different reasons (e.g., retirement or removal of a study course delivered by that teacher), and one was replaced due to poor English knowledge.
More than 10 new courses were introduced to the program (SAR, pp. 924, 925) by new academic staff (e.g., Fundamentals of Computer Control, Internet of Things Technologies), some of them replacing older courses (e.g., Fundamentals of 3D Graphic Modeling and Animation instead of Linear Automatic Control Systems).
The change of lecturers affected the study materials, which were improved and enhanced, as well as the final results of the study process.
The changes made to the study program by younger academic staff give confidence in the quality of implementation of the study program and do not negatively affect it.

2.4.3. Not applicable

2.4.4. According to SAR (pp. 921-923) and Annex 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications.

2.4.5. For a list of courses, the responsible instructors deliver lectures, while other instructors conduct practical classes or laboratory work. Both the responsible and other instructors contribute to preparing and updating study materials.
Knowledge exchange seminars are held (at the faculty, institute, and department levels). (SAR, p. 926)
To avoid overlapping, the content of study courses is checked at the department level. (SAR, p. 926)
The ratio of students and academic staff within the study program is 12.33. (SAR, p. 927)
Mutual cooperation of the teaching staff enables the successful implementation of the study program.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Highly qualified academic staff.
2. Visiting lecturers from the industry are successfully attracted.
3. Younger teaching staff are actively involved in introducing new courses and taking over responsibility for existing courses.

Weaknesses:
none

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

There is full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06 (P06_3.2.1_ECV0(42523)_Compliance with the state education standard_ProfBak_EN.pdf) confirms that the study program complies with Cabinet Regulation No. 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

The attached study course descriptions (P10_DBF0(43526)_StudijuKursuapraksti_LV (3).zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (P28_DBF0(43526)_DiplPielik_LV_DiplSupplemt_ENG (1).zip) complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet Regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Confirmation is provided (Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Provided resumes of staff and RTU confirmation letter (Apliecinājums - valsts valodas zināšanas.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Provided resumes of staff and RTU confirmation letter (Apliecinājums - svešvalodu prasme.edoc) Nr. 02000-2.2.1-e/55 verify that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in the RTU academic bachelor study program “Computer Systems” or in relevant study programs in Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation (Apliecinājums - par zaudējumu kompensāciju.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

Study program fully complies with regulatory enactments

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are more specialization-focused and are fully in line with the goals of this qualification. The content of the study program is topical. The courses are interconnected and complementary, they correspond to

the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. Good provision of the study program - new or renovated buildings, well-equipped laboratories, and a library. The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.
2. Programme is well funded and funding is constantly growing.

Weaknesses:
1. Very high drop-out rate.
2. There is no formal, regular, systematized venue for enabling collaboration with industry and the labor market when it comes, for example, to input or feedback on the academic content of the subjects offered in the study program.
3. The graduates' soft skills are insufficient.

Evaluation of the study programme "Smart Computer Technologies"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Smart Computer Technologies"

Short-term recommendations

1. Activities should be taken to reduce drop-out.

Long-term recommendations

1. The relevance and usefulness of the extent and content of the general scientific knowledge (e.g. math, physics) acquired during the first two years of study with the current program design should be re-considered, in light also of the need to make room for additional topical subjects.
2. Establish formal, regular, systematized venues for enabling collaboration with industry and the labor market.
3. Activities that will enhance the students' soft skills need to be included in the content.
4. Student-centered teaching and learning methods need to be employed in all courses.

II - "Business Informatics" ASSESSMENT

II - "Business Informatics" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Although the study program is interdisciplinary by its character, it belongs to the study field due to a large extent of covering topics of ICT (Annex

P09_3.2.1_DMB0(45526)_Plans_lv_Plan_eng.pdf) and as its content complies with the recommendations of the ACM / IEEE “A Report in the Computing Curricula Series” updated in 2020 in the field of computer science and ICT industry (SAR, p. 791).

2.1.2. The title of the study program is Business Informatics.
The code of the study program is 45526 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `45` notes that this study program is an academic master program and the last three digits `526` indicate that this study program is related to the educational group of “other engineering sciences” Degree to be acquired: Master Degree of Engineering Science in Business Informatics.
The 7 tasks (objectives) of the program correspond to the goal to prepare professionals with expertise in systems thinking and engineering sciences who are able to use, choose, develop, and acquire ICT solutions that enable enterprise development; who are able to design intra- and inter-organizational information systems and are capable of participating in corresponding interdisciplinary and international projects.
The results of the study program (learning outcomes) are adequate (9 outcomes) for the academic master's degree and comply with the aim and objectives of the study program. Learning outcomes include both aspects of ICT and aspects of the business.
Admission requirements (Bachelor's Degree in Engineering Science, Natural Sciences or Social Sciences (Economics, Management), or similar) are adequate. For students who have not previously studied in the field of ICT, preconditions regarding knowledge in databases (2 CP) and computer networks (2 CP) have been established for admission to the study program and appropriate study courses have been provided.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (2 implementation variants) –
* Full-time studies with a duration of 2 years (80 CP/120 ECTS) implemented in the English language
* Part-time studies with a duration of 2.5 years (80 CP/120 ECTS) implemented in the English language
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. Classification code (SAR, p. 790) was changed to 45526 (other engineering sciences, in accordance with Latvian Republic Cabinet Regulations No. 322 of 13 June 2017)Changes in admission preconditions were made (SAR, pp. 790, 791): university study courses at the Bachelor level (Level 6 of LQF / EQF) within the following topics and in the following volume: databases (2 CP), computer networks (2 CP), higher mathematics (2 CP), accounting (2 CP).
The changes made are reasonable and justified for the program's evolution.

2.1.4. Demand for ICT specialists in the labor market indicates good job prospects for graduates of the study program.
Graduates of the study program work at several important Latvian companies (e.g., Accenture, ZZdats, Visma Labs). (SAR, p. 793) The range of positions is fully in line with the profile of the study program, including application development, analytics, consulting, and ICT project and department management.
More than 75% of the graduates of the program work in Latvia, and almost 20% of graduates are from India (SAR, pp. 794, 795).
According to Annex P05_3.1.4_DMB0(45526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, in recent years, the annual number of admitted students 26-50, making the total actual number of students in the program 53-80, whilst the annual number of graduates is 8-14. During the last 4

years, the total number of students admitted is 139, but the total number of graduates is 42, indicating a drop-out rate of 70%.
Almost all students are self-paid.

2.1.5. Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from bachelor studies as well as benefiting from having acquired second-level professional education.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry.

Weaknesses:
1. High drop-out rate.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 799-802) and the Annexes to it, and in the interviews conducted during the visit as well. The SAR provides a good overview of the structure and content of the study program. The study program includes courses that form and develop students' competence for work in the field of business informatics, develop professional, creative, and research skills, as well as create socially responsible specialists capable of working in the field, applying systemic, e.g. scientific and engineering thinking.
In the study program, 38 CP are allocated to the compulsory part, 18 CP to compulsory elective study courses, 4 CP to free elective study courses, and 20 CP to the Master Thesis. According to the content, the study courses can be divided into 3 groups: ICT study courses; business study courses, and integrated study courses. The compulsory courses form the systemic and engineering thinking, operation, and research competencies necessary for the field of business informatics; they are complementary and their learning outcomes, taken together, ensure the achievement of all the learning outcomes and aims of the study program. The compulsory elective part of the study program allows students to acquire in-depth knowledge and skills in 4 thematic groups (Networking, Specific Software Applications, Enterprise Information Systems, and Analytics). The need for enhanced soft skills among graduates has been noted by employers. Students are invited to choose one course from each thematic group, and they are currently offered two recommended sets of options (mainstream and cybersecurity concentration).
The courses are updated so as to ensure the provision of relevant content, and formal surveys of graduates and employers are employed to assess the relevance of the program. In addition, the academic staff and administration monitor similar study programs at other universities (e.g., the University of Vienna, University of Rostock) as well as program-related standards such as

requirements engineering, business analysis, and information security standards; and follow research related to business informatics.
Annex 6 (P06_3.2.1_DMB0(45526)_AtbilstibaValstsStandartam_AkadMag_LV.pdf) of the study program SAR provides a comprehensive mapping of the requirements for compliance of the study program with the state education standard Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards” https://likumi.lv/doc.php?id=266187 (In Latvian)

2.2.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 802-803) and the Annexes to it, and in the interviews conducted during the visit as well. The final requirement for obtaining the degree is the writing and defending of a Master’s thesis. The thesis is an independent research, developed in close cooperation with researchers of RTU FCSIT and also researchers from other countries, taking into account the needs of the industry and current problems.
The thesis and its defense demonstrate the student’s ability to analyze, classify, and compare the ideas presented in the scientific and technical literature in business informatics, to obtain, summarize, analyze and evaluate data using methods, methodologies, technologies, formulate problems, integrate the acquired knowledge and make assumptions about the possible innovative solutions to the problem.
The thesis is expected to produce publishable research results. The degree is awarded on the basis of the results of a reviewed theoretical and/or practical research (Master Thesis) public defense and the examinations within the study courses. Additionally, the academic staff and students of the study program regularly carry out research and participate in scientific projects. Examples of such projects can be found in Annex BI1: The most significant projects of the teachers and students of the study program “Business Informatics” (2013-2021).

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 803-809) and the Annexes to it, and in the interviews conducted during the visit as well. As this is an interdisciplinary program, various methods are used to achieve the aims of the study program. These include teaching and practical work, including in groups; lecturing by the staff of different Universities and/or RTU organizational units; involving practitioners from the field in teaching; independent work; different teaching approaches for specific courses.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 809-812) and the Annexes to it, and in the interviews conducted during the visit as well. During the reporting period (from 2013/2014 to 2020/2021), 38 Master students from Latvia and 39 foreign students defended their Master Theses.
The themes of the Master Theses reflect the scientific novelties relevant to the field and the labor market. Several Master Theses have been developed within the framework of international, scientific, and ERASMUS+ projects.
The themes of the Master Theses can be divided into the following groups: Information Systems Design and Change Management; Methods for Evaluation of ICT Solutions; Requirements Engineering: Artificial Intelligence (AI) and Data analytics; Service-oriented Systems; Cybersecurity; Blockchains; IoT and Industry 4.0; Green Technologies.
The students often choose topics related to the problems at their companies. About 30 scientific articles on the topics developed in the Master Theses have been published in peer-reviewed

conference proceedings and scientific journals, of which 20 articles are indexed in Scopus and five articles are indexed in WoS.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' Masters' thesis are relevant to the field and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall study program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The study program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The topics of the Master's thesis are relevant to the study program.

Weaknesses:
1. The soft skills of the graduates need further enhancement.
2. Student-centered teaching and learning approaches are not employed in full.

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

All criteria are satisfied. No major shortcomings have been identified. Still, some weaknesses have been identified.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
The studies take place in the new or renovated buildings in RTU Ķīpsala Campus.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using

EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program was funded by student fees and from 2021 is funded by the state as well (12 state-funded budget seats). From 2013 to 2021 funding has grown from 34 764 Eur to 176 518,35 Eur. The peak was 2019/2020 with 199 081 Eur. Funding from foreign students was growing all the time as well, except for a small dip in 2020/2021. It is sufficient to support the program, but the reasons for the dip in 2020/2021 should be analyzed, as well as the planned increase of the tuition fee in 2022/2023, and precautions should be taken.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. A number of the students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program has good provisioning, and funding, especially from foreign students, shows the need for the program. Additional 12 government-funded seats make the program more stable as well. However, lower funding in 2020/2021 and an increase in tuition fees should be analyzed and precautions for further dip should be taken.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
2. Growing funding shows the sustainability of the program.

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 provisions are sufficiently met to insure the achievements of the learning outcomes

2.4. Teaching Staff

Analysis

2.4.1. According to SAR (pp. 819, 820), 5 professors and 5 associate professors are involved in the implementation of the study program. The total number of teaching staff involved in the study program is 13 (for compulsory courses) and 9 (for elective courses). The study program involves 15 Ph.D. degree holders, and all the academic staff responsible for the study courses hold a Ph.D. in the corresponding field.
The qualification of the teaching staff is fully compliant with the requirements of the study program.

2.4.2. Young talented instructors are gradually being attracted to the implementation of the study program (SAR, pp. 823, 824). Two new associate professors, two assistant professors, and one Ph.D. student have joined the program (for mandatory courses) during the reporting period. The younger colleagues have gained experience with having collaborated with the experienced professors, and this gives confidence in the quality of implementation of the study program so as not to be negatively affected.

2.4.3.Not applicable

2.4.4. According to SAR (pp. 820-822) and Annex 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications.

2.4.5. Teaching staff members cooperate within the study courses where more than one instructor is involved in the delivery of the course, and have regular formal and informal discussions, as well as participates in the implementation of educational and scientific projects. (SAR, p. 825)
For mandatory courses, the average number of students and instructors holding a Ph.D. degree in the reporting period is approximately 6:1 (SAR, p. 825).
Mutual cooperation of the teaching staff enables the successful implementation of the study program.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Experienced and highly qualified academic staff.

Weaknesses:
none

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06 (P06_3.2.1_DMB0(45526)_AtbilstibaValstsStandartam_AkadMag_LV.pdf) confirms that the study program complies with Cabinet Regulation No. 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

Provided study course descriptions (P10_DMB0(45526)_StudijuKursuapraksti_LV.zip) are prepared in English. Descriptions comply with regulations set forth in 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 sample (P28_DMB0(45526)_DiplPielik_LV_DiplSupplemt_ENG.zip) complies with the procedure by which state-recognized documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Provided confirmation (Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Provided resumes of staff and RTU confirmation letter (annex Apliecinājums - valsts valodas zināšanas.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Provided resumes of staff and RTU confirmation letter (annex Apliecinājums - svešvalodu prasme.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

Annex P15_2.1.4_StudijuTurpin_StudyContinue.zip(P15 2.1.4. RTU confirmation indicates that students have the opportunity to continue studies in RTU study programs “Computer Systems” (acad. master) or “Master of Business Administration” (prof. master).

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157

states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program fully complies with regulatory enactments.

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from high school as well as benefiting from having acquired first-level professional higher education. The study program meets the needs of the industry and the labor market in terms of technical knowledge and skills. The topics of the Master' thesis are relevant to the study program. The program has good provisioning, and funding, especially from foreign students, shows the need for the program. However, lower funding in 2020/2021 and an increase in tuition fees should be analyzed and precautions for further dip should be taken. The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments

Strengths
1. High demand for specialists in the industry.
2. Well-qualified teaching staff.

Weaknesses:
1. Very high drop-out rate.
2. The graduates' soft skills are insufficient.

Evaluation of the study programme "Business Informatics"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Business Informatics"

Short-term recommendations

Long-term recommendations

1. Activities that will enhance the students' soft skills need to be included in the content.
2. Student-centered teaching and learning methods need to be employed in all courses.
3. Activities should be taken to reduce drop-out.

II - "Computer Systems" ASSESSMENT

II - "Computer Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The contents of the study program are oriented to computer science and also information technology and computer control. (SAR, p. 831) Most of the courses of the program (Annex P09_3.2.1_DMD0(45526)_Plans_lv_Plan_eng.pdf) cover topics of ICT. The content is fairly close to the corresponding professional master's study programme.

2.1.2. The title of the study program is Computer Systems.
The code of the study program – 45526 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `45` notes that this study program is an academic master program and the last three digits `526` indicate that this study program is related to the educational group of "other engineering sciences").
The degree to be acquired: Master's Degree of Engineering Science in Computer Systems.
The 8 tasks (objectives) of the program correspond to the goal to prepare specialists with deep knowledge in computer science, software engineering, computer systems development theory, database technologies, programming languages, software development environments, and artificial intelligence.
The results of the study program (learning outcomes) are adequate (12 outcomes) for the academic master's degree and comply with the aim and objectives of the study program. Learning outcomes include both theoretical and practical aspects of ICT.
Admission requirements (Bachelor's Degree of Engineering Science in Computer Systems, or comparable education) are adequate.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (2 implementation variants) –
● Full-time studies with a duration of 2 years (80 CP/120 ECTS) implemented in Latvian
● Full-time studies with a duration of 2 years (80 CP/120 ECTS) implemented in English
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. Classification code was changed to 45526 (other engineering sciences, in accordance to Latvian Republic Cabinet Regulation No. 512 adopted on 26 August 2014 "Regulation on the State Standard of the Professional Higher Education of the Second Level"). (SAR, p. 830)
The volume of the program was changed from 81 CP in 2013 to 80 CP in 2022 (in accordance with Cabinet Regulations, No. 240 of 13 May 2014, "Regulations on the State Academic Education

Standard”). (SAR, p. 831)
The admission requirements have been made more flexible to enroll all students with the appropriate background knowledge. Some study fields (like Programming and Databases) were defined as mandatory before starting the studies (or to be completed during the 1st semester). (SAR, p. 830)
The changes made are reasonable and justified for the program's evolution.

2.1.4. Demand for ICT specialists in the labor market indicates good job prospects for graduates of the study program. (SAR, pp. 832, 833)
93% of graduates are employed one year after graduation, and more than 50% work in the Information and Communication Services sector, which corresponds most closely to the profile of the study program. (SAR, p. 833)
According to Annex P05_3.1.4_DMD0(45526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, in recent years, the annual number of admitted students 52-106, making the total actual number of students in the program 85-155, whilst the annual number of graduates is 8-22 (with approximately the same number of graduates in Latvian and English).
The average number of mobility students in this study program is 19 students per year.
Most of the students are state-funded, but due to the significant increase in international students, the number of self-paid students has increased to 44%.

2.1.5. Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from a bachelor's program in Computer Systems or similar with additional requirements for topic coverage.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.
2. Increasing number of self-paid students.

Weaknesses:
1. Significant overlap with the corresponding professional master study program having the same name.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 836-838) and the Annexes to it, and in the interviews conducted during the visit as well. The aim of the study program is to educate and train specialists with advanced knowledge of computer science, software engineering, and computer systems development theory, as well as programming languages and software development environments. Specialists who are familiar with the latest

technologies in artificial intelligence and databases, and who are able to participate in a software development project by performing various (including managerial) duties, while adhering to IT industry standards and professional ethics. The graduates of the program should be able to work at the university, work as specialists in companies of the IT sector, including research work in the IT industry, as well as continue their studies at the Ph.D. level.
The compulsory part of the program includes courses that amount to 36 CP; these offer in-depth knowledge of the field of computer science in general and its formal foundations and develop the ability to choose appropriate methods for solving a problem, as well as the ability to implement algorithms appropriate to the problem and to use software development environments and tools. Field-specific courses complement the technical knowledge base acquired during the Bachelor studies for practical software engineering problem-solving and decision-making. Among the field-specific courses, the students can choose one of the three majors of the program, namely Computer Systems Design, Applied Computer Science, and Software for Applied Computer Systems. Students choosing the Computer Systems Design major acquire in-depth knowledge related to knowledge management, systems analysis, and design.
In the Applied Computer Science specialization, students gain a deep understanding of object-oriented systems development, modern applied computer science methods, and the quality of software development organization. The major in Software for Applied Computer Systems focuses on specialized software development methods, software security, and intelligent methods for building computer systems. The courses in humanities that are included in the compulsory elective part of the program and the group work included in the other courses develop the social competencies necessary for an IT professional, the ability to continue education and development, and critical and creative thinking. Free elective courses allow students to choose courses according to their professional interests and needs. All majors include relevant seminar-style courses that teach students how to conduct research and how analyze the results of other authors. The need for enhanced soft skills among graduates has been noted by employers.
Annex P08 (P08_3.2.1_DMD0(45526)_Kartejums_lv_Mapping_eng.pdf) of the self-evaluation report provides a comprehensive mapping of the learning outcomes of the courses against those of the program. The mapping indicates that the achievement of the former leads to the achievement of the latter.
The courses are regularly updated, as is also the curriculum, so as to ensure the provision of relevant content, in line with the needs of the labor market and the trends in the IT field.
Annex P06 (P06_3.2.1_DGD0(47526)_AtbilstibaValstsStandartam_ProfMag_LV.pdf) of the study program self-evaluation report provides a comprehensive mapping of the requirements for compliance of the study program with the state education standard Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards” https://likumi.lv/doc.php?id=266187 (In Latvian)
2.2.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 838-839) and the Annexes to it, and in the interviews conducted during the visit as well. The final requirement for obtaining the degree is the writing and defending of a Master’s thesis. The thesis is independent research, taking into account the needs of the industry and current problems. The thesis and its defense demonstrate the student’s ability to analyze, classify, and compare ideas presented in scientific research and technical literature in the field of computer science and information technology, to acquire, collect, analyze and evaluate data, apply methods, methodologies, technologies, computer systems and development tools and languages to solve problems, to formulate problems, integrate the acquired knowledge and make assumptions about possible innovative solutions to these problems. The thesis is expected to produce publishable research results. The degree is awarded on the basis of the results of a reviewed theoretical and/or practical research (Master Thesis) public defense and the examinations within the courses.

2.2.3 Lectures, practical classes, laboratory and independent work implemented individually and in groups, tests, and a graduation paper are employed as teaching methods, at the discretion of the instructors. The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.
The students are offered a wide variety of learning materials (documents, presentations, video recordings, interactive learning materials, etc.). They have the right to propose their own topic for the Master's thesis, thus achieving learning outcomes in an area that interests them. Additionally, they have the opportunity to receive individual tutorials from the academic staff involved in the study program. Further, a wide range of extra-curricular activities is offered to the students.
As stated above, Annex P08 of the self-evaluation report provides a comprehensive mapping of the courses against the program learning outcomes and the report itself argues convincingly on how these outcomes are achieved.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 844-846) and the Annexes to it, and in the interviews conducted during the visit as well. During the reporting period, 59 students graduated from the program, having also completed their Master's thesis. The program offers students thesis topics related to both traditional and fundamental approaches to software development, as well as topics related to the application and research of modern technologies and methods. The Institute of Applied Computer Systems maintains productive collaborations with industry, thus some students select thesis topics defined by and relevant to the industry. The topics of theses lie in the fields of Artificial intelligence; Data storage, search and processing technologies; Systems theory, systems analysis, design, modeling, and systems engineering; E-learning systems; Information systems security; Software development technologies and programming languages; Operating systems and systems programming; Quality of software development processes; E-business solutions. Most theses are on topics that directly correspond to software development technologies and programming languages.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The awarding of a degree is based on the achievements and findings of the relevant field of science. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' Master's theses are relevant to the field and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.

3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The topics of the Master's thesis are relevant to the program.

Weaknesses:
1. The soft skills of the graduates need further enhancement.
2. Student-centered teaching and learning approaches are not employed in full.

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

All criteria are satisfied. No major shortcomings have been identified.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state as well as foreign students fees (33 state-funded budget seats). From 2013 to 2021 funding has grown from 157 172 Eur to 297 263 Eur. The program is popular among foreign students. However, the peak was in 2016/2017 with 391 299 Euro funding, but then it stabilized at ~370 thousand, and last year it dipped to 297 263. It is still well funded, but such a decrease shows certain issues which were not solved.
The number of foreign students is increasing as well. Financially it is one of the best programs.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3.The analysis is based on SAR (section 3.3) and meetings with the program team during the

visit to RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculty and university, and the funding of the program is good. However, the decrease in the funding by 25% is worrying, it should be analyzed and the reason for such a decrease should be identified.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
2. Funding is sufficient, and the program is popular among foreign students.

Weaknesses
1. 25% decrease in funding over the 4 years is a symptom of some issues.

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 provisions are sufficiently met to ensure the achievement of the learning outcomes, however, a 25% decrease in funding is worrying.

2.4. Teaching Staff

Analysis

2.4.1. According to the SAR (pp. 850, 858), the total number of teaching staff in the study program is 28 (including 20 with a doctoral degree). The average age of the academic staff is 47.7 years (SAR, p. 854).
The responsible instructors of the courses are appointed by the head of the responsible structural unit. Instructors responsible for study courses can be professors, associate professors, and assistant professors with a scientific degree in the relevant branch or sub-branch of science. (SAR, p. 850)
All responsible instructors involved in the implementation of the study program hold doctoral degrees, but in total, 71% of the academic staff involved in the implementation of the study program hold doctoral degrees; the number of guest teaching staff is 15 (total during the reporting period). (SAR, p. 850)
Guest lecturers from IT companies in Latvia and abroad, as well as from foreign universities in Morocco, Serbia, Turkey, Lithuania, and other countries are involved. (SAR, pp. 850-852)
Since 2019, several staff members have visited the State University of New York at Buffalo, USA for a semester-long internship. (SAR, p. 852)
The qualification of the teaching staff is fully compliant with the requirements of the study program.

2.4.2. In many cases, young colleagues start their careers at the Institute of Applied Computer Systems already during their studies by getting involved in research projects. (SAR, p. 854)
At two departments there were changes in teaching staff - at the Department of Artificial Intelligence and Systems Engineering, and at the Department of Software Engineering (13 changes in total listed by SAR, pp. 855, 856).
A new course “Testing and Software Quality” replaced “Process Programming”. (SAR, p. 856)
In the case of these academic staff changes, no significant changes in student feedback have been observed. The following principle is being obeyed the quality of the implementation of the study course must not be reduced by the arrival of new academic staff. (SAR, p. 856)
The changes made to the study program by younger academic staff give confidence in the quality of implementation of the study program and do not negatively affect it.

2.4.3. Not applicable

2.4.4. According to SAR (pp. 852-854) and Annex 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications.

2.4.5. All changes in the study program, as well as significant changes in the study courses, are discussed in the Council of the Institute of Applied Computer Systems, an important structure supporting the study program. Responsible instructors are appointed for the courses. (SAR, p. 857)
Academic staff also share their experience on other issues such as student’s academic integrity, graduation papers, and conflict resolution. (SAR, pp. 857, 858)
The number of students per academic staff in the study program is 4.07. (SAR, p. 858)
Mutual cooperation of the teaching staff enables the successful implementation of the study program.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Experienced and well-motivated academic staff.

Weaknesses:
none

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06_3.2.1_DMD0(45526)_AtbilstibaValstsStandartam_AkadMag_LV.pdfconfirms that the study program complies with Cabinet Regulation No. 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 P10_DMD0(45526)_StudijuKursuapraksti_LV.zip) are prepared in latvian and english. Descriptions complies with regulations set forth in 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 sample P28_DMD0(45526)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Provided confirmation Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Provided resumes of staff and RTU confirmation letter (annex Apliecinājums - valsts valodas zināšanas.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Provided resumes of staff and RTU confirmation letter (annex Apliecinājums - svešvalodu prasme.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

Annex P15_2.1.4_StudijuTurpin_StudyContinue.zip (P15 2.1.4.)RTU confirmation indicates that students have the opportunity to continue studies in the RTU study program “Information Technology” (acad. master) or “Business Informatics” (acad. master) or in relevant study programs in Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edocNr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college

(actions or failure to act) and the student does not wish to continue the 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 program is fully compliant with the requirements.

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are fully in line with the goals of this qualification. The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The awarding of a degree is based on the achievements and findings of the relevant field of science. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The program is well supported by the faculty and university, and the funding of the program is good. However, the decrease in funding by 25% is worrying, it should be analyzed and the reason for such a decrease should be identified. The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.
2. Increasing number of self-paid students.
3. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses:
1. Significant overlap with the corresponding professional master study program having the same name.
2. 25% decrease in funding over the 4 years is a symptom of some issues

Evaluation of the study programme "Computer Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Computer Systems"

Short-term recommendations

1. Reasons for the 25% decrease in funding should be identified and, both, short and long-term measures should be taken.
2. One recommends that a thorough analysis is performed regarding the simultaneous existence of study programs having exactly the same name but different types (academic/professional), different duration, or different levels (bachelor/ master)

Long-term recommendations

1. Activities that will enhance the students' soft skills need to be included in the content.
2. Student-centered teaching and learning methods need to be employed in all courses.

II - "Digital Humanities" ASSESSMENT

II - "Digital Humanities" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. According to the self-assessment, the study program is in full compliance with the study field by aiming to fulfill the agenda of digital transformation of Latvia and to attain regional technological leadership by adopting excellent research, modern interdisciplinary studies based on cross-border cooperation, and effective interdisciplinary cooperation. The study program is versatile and combines different subjects but is implemented in the field of engineering which makes engineering the central theme. Yet, most scientific content is related to the study of humanities and not to the field of study of "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science". The versatility of the study program is also its biggest risk and/or weakness due to trying to satisfy so many constraints by catering to the study of humanities, information technology, and computer science all at once.

2.1.2. The title of the study program is "Digital Humanities", code is 45526, and the degree to be obtained is a Master Degree of Engineering Science in Digital Humanities. In the previous accreditation period, the code assigned to the study program was 45482.
(educational program group "Computer Systems, Databases, and Computer Networks" of the thematic field "Computing" of the educational thematic group "Natural Sciences, Mathematics and Information Technology"). This change emphasizes engineering, yet engineering is marginally present in the program.

The goal of the study program, according to the SAR, is to educate specialists in digital humanities whose knowledge and skills meet the demands of the contemporary labor market and research-intensive economy and who are able to work in state and municipal institutions of the EU, as well as in private enterprises in Latvia and abroad. Additionally, the goal is also to implement an open and flexible student-centered study process that would ensure the integration of the latest information technologies in humanities and advanced mastering of the theoretical basis of the chosen scientific and technical field as well as expanding skills and developing independence, initiative, and adaptation skills. According to the SAR, the outcome of the program is graduates who are able to

demonstrate advanced knowledge and understanding in the field of digital humanities, are able to recognize and compare different digital humanities theories, sociological macro, and micro theories, and apply these theories in empirical data analysis. The SAR states that they are able to use a range of knowledge management technologies: information, transmission, storage, and processing technologies, to identify and structure elements of e-content and knowledge management. Graduates are able to work across various disciplines performing a range of multidisciplinary tasks (information mining, information architecture, content management, contextualization, web document creation, teleworking, business applications of social networks, terminotics, internet marketing, culture studies, etc. The outcomes and admission requirements are interrelated. The duration of the study program is 2 full years and the scope of the program is 80 CPs. The implementation language is English. These parameters are reasonable and justified. According to the self-assessment, the “Digital Humanities” program is unique in the Baltic States which could be filling a specific emerging niche that the society needs. The concept envisages interdisciplinary cooperation between six faculties (not specifically mentioned in SAR). The program offers more than 40 courses. The program welcomes students with both engineering and humanities backgrounds which creates a challenge to ensure a commonly expected baseline for courses.
The self-assessment reports a wide range of jobs for the graduates which introduces a risk of a lack of focus in the program.

2.1.3. New admission requirements have been approved since the previous evaluation. The eligible students are with a Bachelor's degree in the natural sciences or engineering sciences, a professional Bachelor's degree in the professional activity areas related to these fields of science, or compatible education; or a Bachelor's degree in humanities, arts, education sciences or social sciences, or a professional Bachelor's degree in the professional activity areas related to these fields of science, or compatible education. The study program code has been changed to 45526 (“Other engineering sciences”). The previous code was 45482. This classification is a common question for the programs in the study field whether the classification system needs to be amended to include more categories so that the programs could be classified into more informative categories. The study program is offered only in English. The language change is justified in the SAR as it provides opportunities for the exchange of good practices as foreign students study at the study program together with local students. It also allows for attracting prominent foreign lecturers, secures access to the latest learning aids and research materials, and provides wider employment opportunities for the students upon graduation, since the knowledge of professional terminology and special language is developed in the course of studies. It is a major challenge to ensure quality and focus across the program. The program offers 4 sub-majors: Multimodal Information Processing, E-Model Design, Preservation of Cultural Heritage and Digitization of Artifacts, and Language Technologies and Communication. This concept requires a large number of students to ensure that all options have sufficient participation to be justified in terms of both direct and indirect costs. The range of courses offered is also very large compared to other programs.

2.1.4. The SAR pp. 626-627 presents the economic and social necessity of the master program as: "evidenced by the
growing demand for hybrid-competent specialists with a degree in an interdisciplinary field in the Latvian and international labor market. Graduates of the study program evaluate and implement the theories and methods of DH in order to solve current contextual tasks and challenges successfully and efficiently, which can be solved only by adopting a cross-disciplinary perspective.
DH specialists are in demand at the state and municipal institutions, IT companies, media centers, e-commerce enterprises, publishing houses, museums, archives, libraries, marketing bureaus, higher education institutions, life-long learning projects, private companies, representatives of foreign companies in Latvia, as well as elsewhere where advanced engineering, IT, network design

skills, knowledge of foreign languages, presentation skills and creative approach to work are required. Within the framework of the study program, students are provided with an opportunity to acquire the above-mentioned competencies at an advanced level."

The number of enrolled foreign students is increasing and the number of local students is stable (From the graph in SAR: 22 - 2018, 19 - 2019, 32 - 2020, 26 - 2021). The fact that the number of foreign students is increasing (From the graph in SAR: 1 - 2018, 8 - 2019, 12 - 2020, 15 - 2021) indicates that this niche seems to be unfilled in the region/world.
In SAR pp. 629 one presents the number of graduates as :"During the reporting period, fluctuations in the number of graduates have been observed. In academic year 2019/2020, the first 10 students completed the study program, including one foreign student. In
2020/2021, 7 students graduated from the study program and in the winter of 2022 another foreign student graduated from the study program."

2.1.5. Not applicable

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

Conclusions
The study program marginally complies with the study field (Most scientific content is related to the study of humanities and not to the field of study “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”). The title, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The code, and degree to be obtained from the study program are marginally fit (the program is mush less engineering sciences than computer usage or humanities).The duration and scope of the study program implementation, as well as the implementation language, are sufficiently reasonable and justified. The corrections made to the study program’s parameters within the assessment of the study field are sufficiently analyzed, and marginally justified (in terms of code) and might be supported. Economic and/or social justification of the study program, dynamics of the number of students, are sufficiently reasonable.

Strengths:
1. It is attractive to international students which suggests that it is a niche that needs filling.

Weaknesses:
1. The study program is in compliance with the study field in a very wide view, that is, in the sense that it is centered around engineering studies but there might be a problem with providing so many options with limited staff and amount of students (courses not being taught due to lack of students).

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The academic master study program "Digital Humanities" are provided as an 80 CP 2-year study program with 4 (technically, more on that later) specializations: Multimodal Information Processing, E-Model Development, Cultural Heritage Preservation and Digitization of Artifacts, and Language Technology and Communication.
36/37 CP are allocated to the compulsory study courses, whereas 18/19 CP are general education study courses for everyone. Rest 18 CP are allocated to the introduction to programming and engineering for students that hold a bachelor's degree in humanities, arts, education sciences, or social sciences or the introduction in humanities that hold a bachelor's degree in information

technologies. 16 CP are allocated to compulsory elective study courses, from which 12 CP are field-specific study courses and 4CP humanities and social sciences study courses. 4 CP are allocated to internship and 20 CP are allocated to the Master Thesis.

The general education study courses of compulsory study courses are mostly about humanities, with one course related to the introduction of artificial intelligence and one to the introduction to big data. That would put this study program in the study field of humanities, however, the achieved degree is in “Other Engineering Sciences”.

As mentioned, the Digital Humanities study program has 4 specializations (modules) - Multimodal Information Processing (Module 1), E-Model Development (Module 2), Language Technology and Communication (Module 2), and Cultural Heritage Preservation and Digitization of Artifacts (Module 4). Out of 4 modules, only 1 and 2 are provided in the last three years, while module 3 is provided in the last two years. Given the number of sustained students in the recent three years and the minimal requirement of 10 students to provide modules, it very well might be possible that all 4 modules are provided to students. This creates an unsustainable situation (both resource-wise and content-wise), where there might not be continuity of modules over the years. Each module consists of 24 CP. However, as 4 courses are the same for all modules (DIP720 Python Programming Language, HSP702 Media, and Society, HSP701 Organization Theory, HSP704 Cognitive and Social Psychology), actual choice and specialization are limited to 12 CP and 4 CP for free elective study courses.

The compulsory study courses for students that hold a bachelor's degree in humanities, arts, education sciences, or social sciences consist of a couple high-level, general-purpose programming language courses (Programming Languages, and to some extent - Development of Web-Applications for the Internet, in total 6 CP) and three introductory courses in Engineering, Computer Science, Software Engineering. One course - DIP217 Applied Software basically teaches using MS Word and MS Excel - cannot be seriously considered related to the IT field. Overall, for students that hold a bachelor's degree in humanities, arts, education sciences, or social sciences less than 20% of CP is related to the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”, which is probably insufficient the needs of the industry, labor market and scientific trends, if we consider this as study program in the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.

The general education study courses for students that hold a bachelor's degree in information technologies include study courses on humanities and social sciences. The aim of those courses is to introduce students to the field of humanities. Yet the current curriculum is at risk of failing this task. One of the study courses intended for IT background students is “Creative Writing and Stylistics” - following the intended outcomes of the study course it is not clear how creative writing as a skill gives a proper theoretical background for students to work within the field of humanities. The study course “Introduction to Humanities and Social Science” sources features bias towards cultural anthropology, which is not surprising, given the fact that 2 CP amount clearly cannot fulfill its objective beyond the most rudimentary introduction within the field of both humanities and social sciences. Also, it is not clear why 4 CP for this module is dedicated to the English language as it does not complement the necessary need for introduction within the field of humanities. To summarize, if the aim of this module is to provide students with an IT background with a basic introduction (also taking into account that the study program is at master levels) within the field of humanities, the learning outcomes and content of study courses do not fulfill its aim.

Also, it is not clear the relevance of “Graphical Editors and Animation Creation Software” as it focuses on basic skills regarding image retouching, editing, and so on and does not align with a general concept of digital humanities which should be an intersection of computing or digital technologies and the disciplines of the humanities. There is no clear justification for having this creative skill study course within the program.

Compulsory elective study courses are largely based on the choice of specialization (module). 12 CP are allocated to compulsory elective study courses, where the study program offers a choice of 43 different study courses. However, in practice, most of the courses are joint study courses with other study programmes, thus not interconnected or complementary to specific the "Digital Humanities" study programme. In the last three years, the study program had 6, 3, and 3 specialized digital humanities courses provided (3 of them – languages – English and Spanish). 4 CP are allocated free elective study courses.
Overall, even considering that the study program is presented as interdisciplinary, it is obvious that the study program is not related to the study field of “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. Less than 20% of the study content is related to IT or CS and thus cannot be considered that fits the needs of the industry, labor market, and scientific trends in the engineering or information technologies field. Furthermore, especially considering that this program is presented as interdisciplinary, only a few courses can be considered as truly interdisciplinary, interconnected, and complementary between IT and humanities fields.

2.2.2. Self-assessment report mentions that graduates of the study program are specialists with “an in-depth knowledge” in IT, natural language processing, digital rhetoric, digital discourse, interdisciplinary semiotics, digitization of cultural objects, corpus data analysis, programming languages, and other fields. However, as discussed in 2.2.1 it is not clear if graduates are considered specialists with in-depth knowledge in IT, natural language processing, and programming languages. In the best case scenario, they have a bachelor's degree plus a couple of study courses in the specialization. And thus, cannot be considered that the study program awarding of a degree is based on the achievements and findings of the relevant field, which based on classification code 526 corresponds to the educational program group “Other Engineering Sciences” of the thematic field “Engineering and Technology”.
Self-evaluation report mentions 3 cases where graduates have contributed to the relevant field of science (2 - both humanities) or artistic creation (1 - exposition).

2.2.3. The self-assessment report describes the use of various methods (self-study, practical classes, workshops and colloquia, laboratory works, study module seminars, guest lectures, and job visits). In practice (interviews with students) student-centered methods are used less. There is some involvement of practitioners of the field in teaching. The self-assessment report also mentions the use of adaptations to the different learning styles of the students, but the only example of it is “students can qualify for the exam using diverse ways of collecting the required number of test points” (self-assessment report 3.2.3.).

2.2.4. The internship is organized during the second (final) year of studies in the 3rd semester. Its volume is 4 CP. Self-evaluation report mentions that the administration is cooperating with partner universities and partner governmental institutions and industry partners and lists a good number of internship partners.
The tasks of the internship are not described in the self-evaluation report. According to the self-evaluation report, “Internship tasks are formulated for each student individually according to the individual work plan”. Self-evaluation report doesn’t provide further information on how such a process is organized. Execution of tasks is monitored by the Internship Supervisor at the company and the Internship Coordinator at the university.

2.2.5. Not applicable

2.2.6. During the reporting period from 2019/2020 (the study program was launched in the

academic year 2018/2019) to 2020/2021, a total of 10+7+1=18 Master students defended their Master's Thesis (self-assessment report, 3.1.4.). Students are motivated to select themes for the Master Thesis that are related to their professional activities and if possible addressed in an interdisciplinary way. The topics of the Master Theses are very different ranging from purely humanities field of science to the application of information technologies in humanities and few are more related to interdisciplinary information and psychology field of study (Master Thesis with themes about UI/UX).
Overall, very few Master Thesis themes are related to the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.

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

Conclusions
Overall, even considering that the study program is presented as interdisciplinary, it is obvious that the study program is not related to the study field of “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. Less than 20% of the study content is related to IT or CS and thus cannot be considered that fits the needs of the industry, labor market, and scientific trends in the engineering or information technologies field. The humanities part of the study program which aims to provide students with an IT background with a basic introduction (also taking into account that the study program is at master levels) within the field of humanities does not fulfill its aim. The learning outcomes and content of study courses don’t provide proper theoretical background for students to work within the field of humanities. Furthermore, especially considering that this program is presented as interdisciplinary, only a few courses can be considered as truly interdisciplinary, interconnected, and complementary between IT and humanities fields. Very few Master Thesis themes are related to the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.

Strengths:
1. Could be well positioned in the industry trends if it would be in the humanities field. Or have much more focus on IT/ML/AI.

Weaknesses:
1. Very weak “digital” part of the study program. Consists only of a couple of programming courses.
2. Study module intended for students with an IT background does not provide the necessary introduction to the field of humanities to ensure successful research work within digital humanities.
3. An unsustainable number of modules and compulsory elective study courses. Students technically are provided with a choice between 4 modules and 43 compulsory elective study courses. In reality - there are at best 3 modules and 10 or so compulsory elective study courses, from which 3-5 courses are tailored specifically to Digital Humanities students.
4. Most scientific content is related to the study of humanities and not to the field of study “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.
5. The content of the study courses is not always well interconnected and complementary. Often individual study course outcomes don’t correspond well with the study programs’ learning outcomes.

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: Partially compliant

The scientific contribution is related to the study of humanities and not to the field of study “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science” or engineering field of study in general. Very few Master Thesis themes are even partially or somehow related to the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the master study program “Digital Humanities”.
It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
According to the SAR pp. 645-646, the academic master study program “Digital Humanities” has an equivalent allocation of some 25 state-funded seats per year, with an own budget of some 171k euros/year (which includes a significant number of tax-paying students). This seems to be sufficient for sustaining the number of enrolled students.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the master study program “Digital Humanities” has an equivalent allocation of some 25 state-funded seats per year, with its own budget of some 171k euros/year (which include tax-paying students). Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to

which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability.

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program's implementation.

Strengths:
1. The access to scientific literature is comprehensive.
2. There is a good logistics (equipment, renovated buildings).

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 provisions are sufficiently met to insure the achievement of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report and in the Annexes to SAR submitted for evaluation, the teaching staff of the master study program “Digital Humanities” is composed of some 30-40 members of academic staff from 6 RTU faculties and other partner institutions. All responsible instructors hold a Ph.D. degree in the respective research field, and many academic staff members participating in the delivery, improvement and/or administration of study courses have been granted the status of LCS expert.
The SAR declares 10 Professors, 12 Assoc. Professors and 6 Assistant Prof. among others. Academic staff from six RTU faculties are involved in the implementation of the study program: Faculty of E-Learning Technologies and Humanities, Faculty of Computer Science and Information Technology, Faculty of Architecture, Faculty of Engineering Economics and Management, Faculty of Electrical and Environmental Engineering, and Faculty of Civil Engineering. The study program is implemented for less than 250 students. The teaching staff provisions are evaluated to conform to the requirements of the Higher Education Law of Latvia.

2.4.2. As presented in the Self-Assessment Report (the teaching staff of the program at the previous evaluation is not mentioned), the teaching staff of the master program “Digital Humanities” has changed significantly with respect to the previous evaluation, mainly due to the involvement of invited (visiting) professors and lecturers.
As observed in criterion 2.4.1., the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This

shows that the responsible structure managed the teaching staff composition change successfully.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report pp. 94, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (pages 650-651) does not mention specific information about publications of all the teaching staff involved in the program (although these publications exist, as explained in the presentation of the key teaching personnel, presented on pages 647-650). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU, access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are more than 30 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) towards the successful implementation of the study program.

Strengths:
1. The teaching staff shows a good mix of academic and applied experience, with good research results (SAR, pages 647-650).

Weaknesses:
1. Limited documentation within the SAR of all the teaching staff (listing, research).
2. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

P06_3.2.1_RHMD0(45526)_AtbilstibaValstsStandartam_AkadMag_EN.pdf confirms that the study program complies with Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards”

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 (HMD0 (45526) Study course description EN.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (HMD0_AkadProgr_Diploms_Pielikums_LV_ENG-combined.pdf)complies with the procedure by which state-recognized documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Confirmation - on compliance of the academic staff.edoc) and SAR 3.4.

indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic master study program"Information technology

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 program is fully compliant to all the requirements.

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

The study program marginally complies with the study field (Most scientific content is related to the study of humanities and not to the field of study "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science").
The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation, as well as the implementation language, are sufficiently reasonable and justified.
The corrections made to the study program's parameters within the assessment of the study field are sufficiently analyzed, and justified and would be supported.
Economic and/or social justification of the study program, dynamics of the number of students, and employment indicators of the graduates of the study program are sufficiently reasonable.
Overall, even considering that the study program is presented as interdisciplinary, it is obvious that the study program is marginally related to the study field of "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science". Less than 20% of the study content is related to IT or CS and thus cannot be considered that fits the needs of the industry, labor market, and scientific trends in the engineering or information technologies field. The humanities part of the study program which aims to provide students with an IT background with a basic introduction (also taking into account that the study program is at master levels) within the field of humanities does not fulfill its aim. The learning outcomes and content of

study courses don’t provide proper theoretical background for students to work within the field of humanities. Furthermore, especially considering that this program is presented as interdisciplinary, only a few courses can be considered as truly interdisciplinary, interconnected, and complementary between IT and humanities fields. Very few Master Thesis themes are related to the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.
The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program's implementation. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are more than 30 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) towards the successful implementation of the study program.

Strengths:
1. It is attractive to international students which suggests that it is a niche that needs filling.
2. The program could be well positioned in the industry trends if it would be in the humanities field, or it could have much more focus on IT/ML/AI.
3. The access to scientific literature is comprehensive and there is a good logistics (equipment, renovated buildings).

Weaknesses:
1. The study program is in compliance with the study field in a very wide view (marginally), that is, in the sense that it is centered around engineering studies but there might be a problem with providing so many options with limited staff and amount of students (courses not being taught due to lack of students). One weakness seems to be the fact that there are so many sub-majors and courses offered that it is challenging to ensure the quality and sustainability of the courses. Also, welcoming both engineering and humanities backgrounds, creates a difficult task to ensure courses are useful and sufficiently challenging for all students.
2. Very weak “digital” part of the study program. Consists only of a couple of programming courses.
3. Study module intended for students with an IT background does not provide the necessary introduction to the field of humanities to ensure successful research work within digital humanities.
4. An unsustainable number of modules and compulsory elective study courses. Students technically are provided with a choice between 4 modules and 43 compulsory elective study courses. In reality - there are at best 3 modules and 10 or so compulsory elective study courses, from which 3-5 courses are tailored specifically to Digital Humanities students.
5. Most scientific content (80%) is related to the study of humanities and not to the field of study “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”.

Evaluation of the study programme "Digital Humanities"

Evaluation of the study programme:

Average

2.6. Recommendations for the Study Programme "Digital Humanities"

Short-term recommendations

1. Consider moving the study program to the field of humanities as that is where most of the study course content is and where the most scientific contribution is expected.
2. Reduce the number of specialization modules and the number of available compulsory elective study courses. The number of specialization modules should be such that it is possible to organize all of them each year. Same with compulsory elective study courses.
3. The Information Technologies part of the study program should be revised to fit the needs of the industry, labor market, and scientific trends in the engineering or information technologies field and teach students really necessary skills to apply IT to humanities.
4. The humanities part of the study program should be revised, moving beyond a basic introduction to humanities such that students can meaningfully contribute to the humanities field of science. And exclude study courses that do not align with the general concept of digital humanities (for example “Graphical Editors and Animation Creation Software”).
5. In many cases, individual study course outcomes don’t correspond well to study programs’ learning outcomes. Consider a change in mapping: instead of mapping study program learning outcomes to study course (and learning outcomes), map study courses to study program outcomes. Also, consider applying Bloom’s Taxonomy or a similar framework when assessing how individual study outcomes contribute to and fulfill study program learning outcomes.
8. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
9. Consider the implementation of a mentoring/ tutoring mechanism for all the students based on the implication of the teaching staff.
10. Consider the documentation of the institutional interactions between teaching staff for the successful implementation of the program.

Long-term recommendations

1. Consider creating a system, where systematic issues with study program and study courses can be followed up and raised in severity and importance if they persist through the years.
2. Communicate research opportunities to students earlier in their studies and make them more systematic.

II - "Information Technology" ASSESSMENT

II - "Information Technology" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Study program is compliant with the study field. The title and contents of the program are fully justified and reasonable with the study field.

2.1.2. The academic master study program “Information Technology” is coded as 45526 – educational program group “Other engineering sciences” in the thematic field “Engineering Science and Technology”; the degree issued upon graduation is Master Degree of Engineering Sciences in

Information Technology; the study duration is 2 years (full time) (80 credit points = 120 ECTS), the teaching language is Latvian. Still, the classification code is vague and the question is whether the classification code should be amended with relevant choices that would be more informative.
The declared goal of the program is “to educate professionals with the highest education in information technology who are able to apply and to optimize advanced information technologies to meet the needs of users within a societal and organizational context and are able to perform scientific research in information technology”, which seems appropriate and justified in relations with the code, duration, and qualifications of the program. The admission requirements are described in the “Regulations on Enrolment in Post-Graduate Academic and Professional Study Programs” approved by RTU Senate and the admission is based on competition; the ranking for admission takes into account the weighted average grade received by candidates during the undergraduate studies.
The title of the study program precisely characterizes the study field, the goal, and the outcomes of the study program. Graduates of the study program work as IT consultants, application developers, IT managers, and systems and modeling specialists.

2.1.3. During the period from the last external evaluation, three corrections have been performed in the parameters of the study program.
First, and most importantly, the classification code of the study program has been changed. During the previous accreditation period, the study program code was 43481, which represented the group of educational programs in Computer Science in the thematic group Natural Sciences, Mathematics, and Information Technologies. The change of the code was made pursuant to Cabinet Regulation No 322 of 13 June 2017.
The most relevant code for the study program is 43526 – educational program group “Other engineering sciences” in the thematic field “Engineering Science and Technology”. Engineering sciences and technologies is the strategic field of specialization of Riga Technical University and the organizational unit in charge of the study program implementation works in the scientific field of Electrical Engineering, Electronics, Information, and Communication Technology. The study program is designed according to the uniform RTU requirements for study programs that prescribe the integration of engineering science-related study courses into compulsory study courses.
The second change involved the change of the overall study load from 81 CP to 80 CP as required by the regulations that one year of studies is 40 CP, which is fully justified.
Third, the admission requirements have been modified, such that the basic requirement of having a Bachelor’s degree in Computer Control and Computer Science is supplemented with “compatible education”. The requirements for admission are justified and reasonable.

2.1.4. As described in the Self-Assessment Report, and fully acknowledged in the evaluation for an international scale, “Information technology is one of the most significant and fastest growing sectors of the Latvian economy, which constantly needs young specialists”. As such, the need and justification for a study program that trains IT specialists are obvious.
The major employers for the graduate (and students) of the “Information Technology” program are “Accenture”, “Tieto”, “Latvenergo”, “TET”, “ZZ Dats”, “Luminor”, “Visma”, " Wonderland Media”, “Squalio Cloud Consulting”, “Ernst & Young”, “Latvijas Mobilais Telefons”, “C.T.Co”, “Scandiweb” (i.e. both national and international firms/corporations). The unemployment rate among program graduates is very low (less than 2%), which is expected (although the presented data are rather old, from 2017/2018).
The admission to the program seems stable in recent years between 16 and 19 per year. The number of graduates has increased considerably in the last reported year which is a positive sign. The master study program “Information technology” starts on average with 28 students in the first year (the average over the last 9 academic years); in the final year of study (the second), on

average, there are 21 students enrolled. It should be also noted that in the last three years, the number of enrolled students dropped significantly by some 33%. The average number of graduates is 10, which represents 13% of the total admission and 50% of the students in their final year. These numbers represent a high dropout of students, in both the first year of study and in the last year of study (failure to prepare/defend the dissertation). The reasons identified in the Self-Assessment Report are the student employment during the studies and the difficulty in writing the dissertation. The management of the program is thus aware of this situation and considers some corrective actions (allowing dissertations based on their own scientific papers, and more involvement of master students in research projects).

2.1.5. Not applicable

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

Conclusions
The program title is compliant with the study field. The program delivers a degree related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable. The program is fully justified and aligned with the labor market requirements.

Strengths:
1. The program has stable admission statistics.
2. The program addresses a broad labor market.

Weaknesses:
1. The vague code might be analyzed further (as the program management should decide whether the program is more “engineering” or more “computer science”).
2. Average graduation number is low and additional effort should be made to increase it (increase admission constraints, better tutoring/ mentoring of the students during their studies).
3. The employment rate of the graduates is not effectively monitored, such that one cannot follow the employment rate 12 months after graduation.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The academic master study program ‘’Information Technology’’ is provided as an 80 CP 2-year study program. The study program consists of compulsory study courses (37 CP), compulsory elective study courses (19 CP), elective study courses (4 CP), and 20 CP are allocated to Master Thesis.
According to the self-evaluation report, the compulsory study courses cover a variety of topics related to information systems, system analysis, data analysis and databases, and information technology management. In a few of these courses research results achieved by the academic staff members are included.
Compulsory elective study courses and field-specific study courses further cover a wide variety of topics from information systems to modeling, high-performance computing to artificial intelligence topics, and management of systems. Overall, 15 different courses are provided for a total of 37 CP where students have to choose courses with 15 CP in total. Self-evaluation report doesn’t report any specific specializations or modules. Compulsory elective study courses Humanities and social sciences study courses and Economics and management study courses provide students with a choice of one course per each, but they are not tailored specifically for IT applications.

In reaction to industry trends, courses in digital transformation, big data technologies, and application of artificial intelligence, cloud computing, cybersecurity, and merging of digital and virtual spaces have been introduced in recent years.
Overall, the content of the study program is topical. Still, the content of the study courses is not always well interconnected and complementary, especially compulsory elective study courses as they don't offer clear pathways to specializations. Few courses incorporate the research results of academic staff. The content of the study program generally follows the industry, labor market, and scientific trends.

2.2.2. The final requirement for obtaining the degree is the writing and defending of a Master's thesis. The degree is awarded based on the results of a reviewed theoretical and/or practical research (Master Thesis) public defense and the examinations within the study courses. As stated in the self-evaluation report, scientific research is mainly carried out in systems analysis, modeling, and design, the sub-sector of electrical engineering, electronics, information, and communication technology. Major areas where students are involved in research are digitalization, IT governance and cybersecurity, big data technologies and intelligent systems, and modeling and analysis of complex systems. There are publications within part of master thesis work, but while there are publications in journals, most results are published in national-level or C-or-below-level international conferences. Overall, while not outstanding, the achievements and findings are of the relevant field of science.

2.2.3. Various methods are used to achieve the aims of the study program and there is good involvement of practitioners of the field in teaching. Different study methods used in the implementation of the study program are used and are relevant to the learning outcomes of the study program, including methods of student-centered learning. Project-based and group-learning-based approaches are limited and there are a lot of courses that students have to learn in parallel. Group-work learning and practical work methods are used, but considering the field of the studies and industry needs (engineers also with soft skills), they probably should be used even more.

2.2.4. Not applicable

2.2.5. Not applicable

2.2.6. During the reporting period (from 2015/2016 to 2020/2021 - as per the self-evaluation report), 49 Master's students defended their Master's thesis. The main themes of the master thesis have been big data technologies and machine learning (19), cloud computing (4), complex company systems (8), cybersecurity (4), and augmented reality (2). While big data, machine learning, and cloud computing are still relevant to the IT field, these topics probably correspond less to the specific study program, and more to available resources, the most up-to-date equipment, and research areas for faculty in general.
Few Master Theses have contributed to the relevant field of research and the results of the master's thesis have found application in IT solutions for transport and medicine fields.

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

Conclusions
Overall, the content of the study program is topical and the content of the study program generally follows the industry, labor market, and scientific trends (yet, a all Master's degree in IT in general, it is not well-regarded in the industry). However, the content of the study courses is not always well interconnected and complementary, especially compulsory elective study courses as they don't offer

clear pathways to specializations. Several international research and national research projects are ongoing, where academic staff/students/research institutions are involved. However, few courses incorporate the research results of academic staff. The degree is awarded based on the results of a reviewed theoretical and/or practical research (although not outstanding), the achievements and findings are relevant to the field of science. Student-centered learning methods, such as group-work learning and practical work methods are used, but considering the field of the studies and industry needs (engineers with good soft skills), probably should be used even more.

Strengths:
1. The content of the study program is topical and the content of the study program generally follows the industry, labor market, and scientific trends.
2. Several international research and national research projects are ongoing, where academic staff/students/research institutions are involved.

Weaknesses:
1. The study program somehow struggles with clear specialization in field-specific study courses.
2. Too little focus on research, research methodology knowledge, and skills for the Master's program.
3. Only a few courses incorporate the research results of academic staff.
4. Graduates lack soft skills, which are highly regarded in the industry.

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 program fulfills all criteria and requirements, although the program requires some improvements in the achievement of soft-skills (very relevant to the industry) and the research of the students (in order to increase the relevance of the research performed for the dissertation).

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. According to the SAR, the study process is ensured by the academic and technical staff of FCSIT, including the following units of FCSIT and RTU: 1) FCSIT Institute of Information Technology; 2)FCSIT Institute of Applied Computer Systems; 3) FCSIT Institute of Intelligent Computer Technologies; 4) RTU Institute of Technical Physics; 5) RTU Faculty of E-learning Technologies and Humanities. RTU institutes and their departments ensure the training and methodological work: develop and update the curriculum, provide delivery of corresponding study courses, supervision and examination of final theses and carry out other activities related to teaching, methodological and research work.

Methodological and informative provision is based on the services provided by the RTU Scientific Library (SL). RTU Scientific Library is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure the RTU study process and research activities, as well as provides a library, bibliographic, and information services to RTU students, academic and general staff. The Library stocks more than 1.29 million

printed documents and e-resources in RTU industry specific databases.
During the expert visit, it was identified that the library has an accessibility-based policy. The library is accessible to students 24/7. The extensive database is accessible remotely to the university staff and students through the ORTUS portal. The visit found no evidence that the library is not able to provide information support for the study program.
According to SAR, RTU provides funding for information resources for each study program according to certain financial calculations. The collection is replenished according to the recommendations of the heads of the study program, and researchers, in compliance with the allocated funding. Meetings with both teaching staff and students did not reveal any evidence of problems in the renewal of the library's information resources.
According to the SAR modern software that corresponds to educational needs and the current trends is used in the study process: FCSIT cloud computing platform “CloudStack”, MatLab, CPLEX, Microsoft, SAP, JetBrains, JIRA, ARENA, software tools ARENA VISUAL DESIGNER, ARENA INPUT ANALYZER, ARENA OUTPUT ANALYZER, OPTQUEST for ARENA and SIMUL8, etc. During the visit and meetings with RTU staff and students, there was no evidence of any problems with the available software resources.
The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs. During the experts' visit, it was identified that the Moodle platform is widely used and accepted among the teaching staff and students.
The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable.

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and essential procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report.
In SAR pp. 383 one declares that "The minimal number of students in the study program that ensures its cost-effectiveness is 40
students in all study years." According to data presented in SAR pp. 382, the average financing of the program is at some 175k euros. According to SAR pp. 364, the average number of enrolled students is 42, but in the last two years there were less than 40 students. For the moment, the number of students in the study program and in the faculty, combined with other funding sources, is sufficient, but if the descending trend of enrollment continues, this might be a threat.

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

Conclusions
The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master study program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) supports momentarily the program's implementation.

Strengths:
1. High-quality facilities for the implementation of the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library.
2. High-quality and responsive IT support.

Weaknesses:
1. A decreasing trend in the number of enrolled students.

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

All criteria are satisfied. No major shortcomings have been identified.

2.4. Teaching Staff

Analysis

2.4.1. Qualifications of staff are appropriate. Namely, 10 professors (full and associate), and 16 Ph.D. degree holders, are involved in the study program implementation, and their qualifications meet the needs of the study program. The research record of professors (research publications, research projects) is very good and convincing. Some of them are visiting professors at prestigious universities abroad. There is an example of the use of the Erasmus exchange program for professional development; it can be used more extensively.
The development of contemporary teaching skills is not considered with the same attention as research skills. Primarily, ESG is not implemented fully since there is no mention of a learning outcomes-based approach either in SAR or in the evaluation visit. In the SAR it was written about “acquisition of knowledge” and learning outcomes or any other student-centered instrument are not referred to. Alignment of study program learning outcomes with learning outcomes on the course level can contribute to higher mutual cooperation of the academic staff.

2.4.2. It is positive that during the reporting period, renewal of the academic staff has been considered important and a decrease in the average age of staff is noted. Several promotions of academic staff are performed. In the SAR 3.4.2. it is noted that the academic staff during the reporting period is estimated as stable and that the distribution of the academic staff corresponds to the needs of the study program and that the benchmark with the learning universities around the world has been made.
The current student-to-staff ratio is 8 which is adequate and the academic staff is motivated.
Gender disbalance towards male domination among academic staff as well as the issue of the “glass ceiling” (fewer female professors in the highest ranks and management) has to be considered.

2.4.3. Not applicable.

2.4.4. As presented in the Self-Assessment Report pp. 94, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management

of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean's management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (pp. 384-388) does not mention specific information about the yearly publications of the teaching staff (although these publications exist). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. In the SAR 3.4.5. the composition of the study program (sequencing of courses) has been described. It is also argued that the study courses are complementary. But no student/graduate survey to check on the coherence and complementarity of the courses and their alignment with the study program's goals and learning outcomes has been mentioned.
It is also mentioned (SAR 3.4.5.) that the experience exchange amongst the academic staff is promoted at the methodological seminars. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program would benefit from a more coherent study program and course learning design approach.

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

Conclusions
Qualifications of staff are appropriate. The academic staff of the academic study program complies with the specified requirements with high research activity impact. More attention should be given to the professional development of contemporary student-centered teaching and learning approaches among the academic staff. It is positive that during the reporting period, renewal of the academic staff has been considered important and decrease in the average age of staff is noted and several promotions of academic staff are performed. Mutual cooperation of the teaching staff has been promoted via seminars. Still, it can be advanced if the vertical alignment of learning outcomes at the study program level and the course level is ensured by the use of a learning design approach.

Strengths:
1. Qualifications of staff are appropriate for the study program delivery.
2. Renewal of the academic staff has been considered important and decreases the average age of the academic staff.
3. Benchmarks with learning universities around the world have been made.
4. Mutual cooperation of the teaching staff has been promoted via seminar.

Weaknesses:
1. Development of contemporary teaching skills is not considered with the same attention as the research skills. Mutual cooperation of teaching staff can be advanced by using a learning design approach.
2. Gender disbalance towards male domination, especially the "glass ceiling" effect.
3. No student/graduate survey to check on the coherence and complementarity of the courses and their alignment with the study program's goals and learning outcomes.

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

All criteria are satisfied. No major shortcomings have been identified. Minor shortcomings are related to development of contemporary teaching skills, gender imbalance in teaching staff and lack of student perspective on alignment of study program goals and courses learning outcomes.

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

P06_3.2.1_DMI0(45526)_AtbilstibaValstsStandartam_AkadMag_EN.pdf confirms that the study program complies with Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards”

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 (A10_DMI0(45526)_StudyCoursesdescr_ENG.zip) are prepared in Latvian and english. Descriptions comply with regulations set forth in 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 sample (P28_DMI0(45526)_DiplPielik_LV_DiplSupplemt_ENG.zip)complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Confirmation - on compliance of the academic staff.edoc) and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic master study program “Computer Systems”

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 program fulfills all requirements.

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

The program title is compliant with the study field. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable. The program is fully justified and aligned with the requirements of the labor market. The program is not joint. Overall, the content of the study program is topical and the content of the study program generally follows the industry, labor market, and scientific trends. However, the content of the study courses is not always well interconnected and complementary, especially compulsory elective study courses as they don't offer clear pathways to specializations. Several international research and national research projects are ongoing, where academic staff/students/research institutions are involved. However, few courses incorporate the research results of academic staff. The degree is awarded based on the results of reviewed theoretical or practical research. While not outstanding, the achievements and findings are of the relevant field of science. The program benefits from high-quality facilities for implementing the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library. Qualifications of staff are appropriate for the study program delivery.

Strengths:
1. The program has stable admission statistics.
2. The program addresses a wide labor market.

Weaknesses:
1. The vague code might be analyzed further (as the program management should decide whether the program is more “engineering” or more “computer science”).
2. Average graduation number is low and additional effort should be made to increase it (increase admission constraints, better tutoring/ mentoring of the students during their studies).
3. Consider the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
4. Graduates lack soft skills, which are highly regarded in the industry.

Evaluation of the study programme "Information Technology"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Information Technology"

Short-term recommendations

1. The program classification code might be analyzed further (as the program management should decide whether the program is more “engineering” or more “computer science”).
2. The program management should implement a plan for the student drop-out rate reduction.
3. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
4. Consider how to find out the student perspective on the coherence and complementarity of the courses and their alignment with the study program’s goals and learning outcomes.
5. Consider student/graduate surveys to check on the coherence and complementarity of the courses and their alignment with the study program’s goals and learning outcomes.
6. Increase the number of project-based courses, and group-learning-based courses where it is possible to attain soft skills through learning by doing. Consider more module-based courses, merging similarly themed courses to make room for more project-based and group-learning-based approaches and limit the number of courses that students have to learn in parallel.
7. More courses should be based on research results of the academic staff and/or academic staff should align their research activities such that they are relevant to courses they are teaching when possible. Additionally where possible, academic staff can involve industry R&D people in courses.
8. Add more opportunities to learn about research, and research methodology and provide more opportunities for students to participate in research activities.

Long-term recommendations

1. Prepare a systematic plan for the development of contemporary teaching skills including using a learning design approach for mutual cooperation of teaching staff.
2. Consider the situation related to the gender composition of teaching staff and based on that long-term plan to attract more female professors.

II - "Intelligent Robotic Systems" ASSESSMENT

II - "Intelligent Robotic Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The study program complies with the study field. The title ("Intelligent Robotic Systems") and contents are well aligned with the study field as there is a focus on intelligent systems rather than general robotic systems. The study program combines robotics and artificial intelligence which is a growing interdisciplinary field. The courses in the study program combine three faculties which are positive since the best expertise can be utilized for each discipline but also brings challenges of quality assurance, mutual cooperation and shared focus.

2.1.2. The title, code, degree to be obtained of the study program, aims, objectives, learning outcomes, and admission requirements are interrelated. The title of the study program is "Intelligent Robotic Systems", the degree awarded is ''Master Degree of Engineering Science in Intelligent Robotic Systems''. According to the SAR, the aim of the study program is to prepare professionals who can be characterized by the ability to think systematically, to analyze, develop and implement technically and economically reasoned robotic and intelligent system solutions that promote the application of these solutions to ensure organizations' labor productivity increase and growth, as well as to develop students' ability to carry out scientific work, to participate in local and international projects and to continue studies at Doctoral study programs. The outcome of the program is graduates who are able to develop solutions to particular problems by using modern automatic and electric drive elements, able to develop an automatic or robotic system's control algorithm, able to develop software for a specific robotic or automatic equipment management and coordination, able to develop solutions that combine hardware and software technology advantage, knows how to distinguish problems that should be solved with hardware resources from those which should be solved with software resources, knows how to identify problems that can be solved with intelligent robotic systems, able to independently acquire new knowledge and skills and more. The students eligible for enrolment are required to have a Bachelor's degree in Engineering Science in Computer Control and Computer Science, Computer Systems, Information Technology, Intelligent Robotic Systems, Electrical Engineering, or Bachelor's degree in Natural Sciences in Computer Science, Mathematics, Physics, or comparable education. The duration of the studies is 2 full years. The study program is implemented in Latvian as a full-time intramural study program with a volume of 80 CP. The duration and scope of the study program implementation are reasonable and justified.

2.1.3. The code of the program is 45526 (“Other engineering sciences”) and the degree awarded is “Master of Engineering Science in Intelligent Robotic Systems”. The program code was 45481 - Information Technology, Computer Engineering, Electronics, Telecommunications, Computer Control, and Computer Science, with the degree "Master of Engineering in Computer Control and Computer Science". The SAR states that the changes were implemented due to the fact that, according to the current classification, the field of Computer Science is currently partially included in the field of Computing (48), but the fields of Robotics and Artificial Intelligence, which are at the core of this study program, cannot be included in Computing. Therefore, changes were necessary to change the code to the above in order to reflect as accurately as possible the nature and content of the study program. It is a question for many study programs in the study field whether the code classification system should be amended to have more categories that would cover the programs better. If so many study programs are classified as “other engineering sciences” then it is very uninformative and indicative of an ineffective classification system.

2.1.4. The market trends for robotics are positive across the board which indicates a positive outlook for the study program.
The student dynamics for the study program are generally stable which is indicative of the sustainability of the study program. The enrollment appears to be from the graph in SAR, 6 in 2020, 8 in 2019, 8 in 2018, and 8 in 2017. The dropout is low in recent years which is also a positive sign. The dropout appears to be from graph, 1 in 2021, 3 in 2020, and 2 in 2019. The annual graduation number is in the range of 2-4 in recent years. The percentage of graduates of the study program needs more improvement.
The SAR corresponding to this requirement (pp. 464-469) does not mentions any graduate employement statistics. On the average the program has 3 graduates/year (SAR. pp 469).

2.1.5. Not applicable

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

The study program complies with the study field. The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation, as well as the implementation language, are justified. The corrections made to the study program's parameters within the assessment of the study field are sufficiently analyzed, and justified and would be supported. Economic and/or social justification of the study program and dynamics of the number of students are sufficient for successful program implementation
The employment indicators of the graduates of the study program are not presented

Strengths:
1. The study program has stable student dynamics and the economic justification for the program is reasonable. The enrollment is in the range of 6-8 in recent years.

Weaknesses:
1. The number of graduates from the study program (graduation percentage) needs further improvement. The annual graduation number is in the range of 2-4 in recent years.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The academic master study program "Intelligent Robotic Systems" is provided as an 80 CP 2-year study program. The study program consists of compulsory study courses (37 CP), compulsory elective study courses (19 CP), elective study courses (4 CP), and 20 CP are allocated to Master Thesis.
According to the self-assessment report, the compulsory study courses are divided into three parts: General education study courses, Field-specific theoretical basic study courses, IT study, and Field-specific professional study courses. General education study courses are research methods and basics of labor protection. Field-specific theoretical basic study courses and IT studies cover QA and testing, AI, and Multiagent systems. Field-specific professional study courses cover topics related to automatization, advanced robotics, signal processing, and sensor networks.
Compulsory elective study courses offer two specializations (not fixed as modules): Hardware and control of robotic systems and Robotic system design. Overall, 17 different courses are provided for a total of 50 CP where students have to choose courses with 15 CP in total. However, project-based, group-learning, and hands-on learning approaches are somewhat limited. CDIO or similar educational framework (Conceive - Design - Implement - Operate) may be used to achieve better-

interconnected courses/modules.
Compulsory elective study courses Humanities and social sciences study courses and Economics and management study courses provide students with a choice of one course per each, but they are not tailored specifically for IT applications.
Overall, the content of the study program is topical, and the content of the study courses is interconnected and complementary, especially compulsory elective study courses as pathways to specializations. Few courses incorporate the research results of academic staff. The content of the study program generally follows the industry, labor market, and scientific trends. Several international and national research projects are ongoing, where academic staff/students/research institutions are involved.

2.2.2 The final requirement for obtaining the degree is the writing and defending of a Master's thesis. The degree is awarded based on the results of a reviewed theoretical and/or practical research (Master Thesis) public defense and the examinations within the study courses. As stated in the self-assessment report pp.474-475 (section 3.2.2), scientific research is mainly carried out in robotics and advanced artificial intelligence techniques.

2.2.3 Various methods are used to achieve the aims of the study program: lectures or practical classes, group work, or independent work (both at home or in the laboratory). There is evidence that student-centered learning methods are sometimes used (self-assessment report section 3.2.3, course descriptions, interviews with teachers and students). Also, students have access to prototyping laboratories for the design and development of robotics systems starting from the first semester. Group work is supported by several courses and student collaboration within a group is also encouraged. To support students and the implementation of learning methods students have access to modeling software systems, different equipment, laboratories, and virtual solutions which are relevant to industry needs. Students also have opportunities to participate in research (in some cases the study program offers part-time work in specific research projects).
Specialized courses with 3 or 4CP that allow the development of theoretical knowledge and acquisition of practical skills are a good start. However, the project-based and group-learning-based approaches to allow the development of soft skills and further enhance student-centered learning are somehow limited as there are a lot of courses that students have to learn in parallel.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 During the reporting period (from the previous evaluation to 2020/2021), 25 Master's students defended their Master's thesis. The main themes of the master thesis have been robotic controls (28%), sensor data processing (24%), machine learning (20%), and software development (which may not be directly related to robotic systems) (12%). These topics are relevant to the field and have been on par with industry trends.

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

Conclusions
Overall, the content of the study program is topical, and the content of the study courses is interconnected and complementary, especially compulsory elective study courses as pathways to specializations. Few courses incorporate the research results of academic staff. The content of the study program generally follows the industry, labor market, and scientific trends. Several international and national research projects are ongoing, where academic staff/students/research

institutions are involved. The degree is awarded based on the results of a reviewed theoretical and/or practical research. Scientific research is mainly carried out in robotics and advanced artificial intelligence techniques. Topics of the Master's thesis are relevant to the field and have been on par with industry trends. However, the project-based and group-learning-based approaches to allow the development of soft skills and further enhance student-centered learning are somehow limited as there are a lot of courses that students have to learn in parallel.

Strengths:
1. Field-specific theoretical basic study courses and IT study and Field-specific professional study courses, and the compulsory elective courses and Field-specific study courses generally are well interconnected and complementary and correspond to specific industry needs
2. Students have access to prototyping laboratories for the design and development of robotics systems starting from the first semester. Students have access to modeling software systems, different equipment, laboratories, and virtual solutions which are relevant to industry needs.

Weaknesses:
1. Project-based and group-learning-based approach to allow the development of soft skills which are in great need in the industry and further enhance student-centered learning is somehow limited and as there are a lot of courses that students have to learn in parallel.

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 requirements are fulfilled.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the excellent implementation of the master study program "Intelligent Robotic Systems".
It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
The study program is sustained mostly by The Faculty of Electrical and Environmental Engineering as the most important contributor, providing the necessary measuring equipment and visual learning aids for the study process, in particular Siemens industrial automation laboratory, motor control equipment, etc. Special equipment available to students is a Baxter robot, Pepper robot, ABB IRB 1200/ 1600 robots, CNCN and laser cutting equipment, 3D printers, SMD assembly line, prototyping room, and Measuring equipment. It should be noted that the program involves the use of a special hardware infrastructure (robotics), which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the robotic platforms.

According to the SAR pp. 485, the bachelor study program “Intelligent Robotic Systems” has an equivalent allocation of some 8 state-funded seats per year, with an own budget of some 38k euros/year (which does include a small number of tax-paying students). This seems to be sufficient for sustaining the number of enrolled students, but not sufficient for the resilient development of the program.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility of ensuring a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the master study program “Intelligent Robotic Systems” has an equivalent allocation of some 6-8 state-funded seats per year, with an own budget of some 38k euros/year (which does not include tax-paying students). Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items"
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability. The current program has on average some 10 students enrolled in the first year (on average over the last 3 years, according to SAR pp. 467) and as such does not seem profitable.

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master's program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation in this current form but poses problems with regard to the program development. It should be noted that the program involves the use of a special hardware infrastructure (robotics), which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to ensure the continuous upgrade of the robotic platforms.

Strengths:
1. The access to scientific literature is comprehensive.
2. There are good logistics (equipment, renovated buildings).

Weaknesses:
1. The continuous upgrade of robotic platforms must be considered.

2. The allocated budget is too small in order to compete successfully with top-tier universities.
3. The small number of enrolled students poses problems with respect to the program's resilience and development.

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 provisions are sufficiently met to insure the achievements of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report and in the Annexes to SAR submitted for evaluation, the teaching staff of the master study program “Intelligent Robotic Systems” nominally lists 4 Professors and 2 Assoc. Professors, all of them holding a doctoral degree (in Engineering or Economics). The total number of teaching staff involved in the program is not explicitly listed (although SAR 3.4.2 mentions that "'The total number of academic staff as well as the distribution of qualifications did not change significantly during the reporting period, with 9 professors, 6 associate professors and 1 assistant professor being involved in program implementation'"). The study program is implemented for less than 250 students. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

2.4.2. As presented in the Self-Assessment Report (the teaching staff of the program at the previous evaluation is not mentioned), the teaching staff of the master program “Intelligent Robotic Systems” has not changed significantly with respect to the previous evaluation. There are a total of 16 persons, 9 professors, 6 associate professors, and 1 assistant professor. As observed in 2.4.6, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report pp.94 “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (page 490) does not mention specific information about publications of all the teaching staff involved in the program (although these publications exist, as explained in the presentation of the key teaching personnel, presented on pages 486-487). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching

staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program. Still, the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU, access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 16 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) towards the successful implementation of the study program.

Strengths:
1. The teaching staff shows a good mix of academic and applied experience, with good research results.

Weaknesses:
1. Limited documentation within the SAR of all the teaching staff (listing, research).
2. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

P06_3.2.1_DMR0(45526)_CompliancewiththeStateEducationStandard_AkadMag_ENG.pdfconfirms that the study program complies with Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards”

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 (A10_DMR0(45526)_StudyCoursesdescr_ENG.zip) are prepared in Latvian and English. Descriptions complies with regulations set forth in 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 sample (P28_DMR0(45526)_DiplPielik_LV_DiplSupplemt_ENG.zip)complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Confirmation - on compliance of the academic staff.edoc) and SAR 3.4. indicates compliance with requirements set forth by 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

The clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of attached study agreement (Study_agreements.zip) complies with Cabinet Regulation Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic master study program “Computer Systems”

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 program is fully compliant with the criteria.

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

The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation, as well as the implementation language, are sufficiently reasonable and justified. Overall, the content of the study program is topical, and the content of the study courses is interconnected and complementary, especially compulsory elective study courses as pathways to specializations. Few courses incorporate the research results of academic staff. The content of the study program generally follows the industry, labor market, and scientific trends. The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master's program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation in this current form but poses problems with regard to the program development. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

Strengths:
1. The student dynamic is stable.
2. Students have access to prototyping laboratories for the design and development of robotics systems starting from the first semester. Students have access to modeling software systems, different equipment, laboratories, and virtual solutions which are relevant to industry needs.
3. Very good logistics and access to the scientific literature.
4. The teaching staff shows a good mix of academic and applied experience, with good research results.

Weaknesses:
1. The number of enrolled students and the number of graduates students must be improved.
2. Project-based and group-learning-based approaches to allow the development of soft skills which are in great need in the industry and further enhance student-centered learning somehow limited as there are a lot of courses that students have to learn in parallel.
3. Limited documentation regarding the teaching staff and their institutional cooperation within the program.

Evaluation of the study programme "Intelligent Robotic Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Intelligent Robotic Systems"

Short-term recommendations

2. Increase the number of project-based courses, and group-learning-based courses where it is possible to attain soft skills through learning by doing. Consider more module-based courses, merging similarly themed courses to make room for more project-based and group-learning-based approaches and limit the number of courses that students have to learn in parallel. CDIO or similar educational framework (Conceive – Design – Implement – Operate) may be used to achieve better learning outcomes and even better interconnected and complementary study courses.
3. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
4. Consider the implementation of a mentoring/ tutoring mechanism for all the students based on the implication of the teaching staff.
6. Consider the documented mechanisms of teaching staff cooperation toward program implementation.
7. Consider the analysis of under-enrolment (below the 19-student limit established by RTU) on the resilience and development of the program with conclusions for corrective measures.
8. Consider the planning of the hardware upgrade and include the cost estimates in some financial planning.
5. Consider implementing a consistent plan for the reduction of the student drop-out rate and increase the number of enrolled students/ graduates.

Long-term recommendations

1. Consider creating a system, where systematic issues with study programs and study courses can be followed up and raised in severity and importance if they persist through the years.
2. Consider creating student portfolios as part of their potential CV. For example, support and request creating git repositories with all student coding and project activities.
3. Communicate research opportunities to students earlier in their studies and make them more systematic.

II - "Cybersecurity Engineering" ASSESSMENT

II - "Cybersecurity Engineering" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The contents of the study program are oriented to computer science and also information technology. (SAR, p. 988) Most of the courses of the program (Annex P09_3.2.1_DMK0(45526)_Plans_lv_Plan_eng.pdf) cover topics of ICT.

2.1.2. The title of the study program is Cybersecurity Engineering.
The code of the study program – 45526 ((according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the

following codification: meaning of the first two digits `45` notes that this study program is academic master study program and the last three digits `526` indicate that this study program is related to the educational group of “other engineering sciences).
The degree to be acquired: Master's Degree of Engineering Science in Cybersecurity.
The 7 tasks (objectives) of the program correspond to the goal to prepare top-level specialists in cybersecurity.
The results of the study program (learning outcomes) are adequate (13 outcomes) for the academic master's degree and comply with the aim and objectives of the study program. Learning outcomes include both theoretical and practical aspects of ICT.
Admission requirements (Bachelor's Degree of Engineering Science, or comparable education) are adequate.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (1 implementation variant) –
* Full-time studies with a duration of 2 years (80 CP/120 ECTS) implemented in English
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. This is a new program with the first admission in 2021/2022. (SAR, p. 991)

2.1.4. Demand for ICT specialists in the labor market indicates good job prospects for graduates of the program. According to the opinions of industry experts, in the global market, the deficit of cybersecurity specialists amounted to 2.7 million in 2021. In accordance with the laws and regulations of developed countries, companies should appoint a knowledgeable specialist responsible for IT security. (SAR, p. 990)
According to P05_3.1.4_DMK0(45526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, the number of students admitted in 2020/2021 is 25. Most of the foreign students come from India.

1.5.Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from a bachelor's program in Engineering Science or similar.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.

Weaknesses:
none

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR)

pp. 991-997) and the Annexes to it, and in the interviews conducted during the visit as well. The aim of the program is to educate and train high-level specialists in cybersecurity, who 1) would fully understand and develop cybersecurity policies for companies and different types of organizations, and public space; 2) would create, implement, manage and proactively improve the measures for ensuring cybersecurity; 3) would carry out research in cybersecurity on an international level; and 4) would continue education for professional competence advancement or at Ph.D. study programs. The program has been developed in consultation with the industry.
The volume of the program is 80 CP. This breaks down into compulsory courses in Part A (40 CP), compulsory elective courses in Part B (16 CP), free elective study courses in Part C (4 CP), and the Master Thesis (20 CP). The compulsory courses provide advanced theoretical knowledge in cybersecurity covering such aspects as research and provision of security of computer networks, software, information systems, and industrial and critical infrastructure. These courses also aim at ensuring the development of research skills necessary for acquiring an academic Master's degree. However, the students are not sufficiently motivated to pursue such studies. Specialization study courses (Part B, Sub-part B1) develop the knowledge framework in cybersecurity in such areas as engineering systems, socio-technical systems, e-commerce, data mining, and data integration. Study courses in Sub-part B2 complement the technical curriculum of the program with knowledge of human and business behavior in the digital era. The thesis focuses on testing student ability for independent self-development and self-education in the field of cybersecurity, as well as their ability to perform scientific research.
Annex 8 P08_(3.2.1_DMK0(45526)_Kartejums_lv_Mapping_eng.pdf) presents data on the contribution of courses to the achievement of the results and the learning outcomes of the program.
However, it appears that the curriculum has been put together by considering the existing staff expertise rather than the needs of a cybersecurity program at the Master's level. Hence
1) some of the offered courses are not relevant to the program, e.g.
1a) DOP700 - the course is more relevant for software developers and architects, not cybersecurity specialists,
1b) EEI705 - course for software developers,
1c) DMI728 - course for Artificial Intelligence, Data analysis specialist, almost irrelevant for cybersecurity specialist,
1d) DOP724 - software engineering, data science, information systems.
2) while some are somewhat relevant, e.g. DOP715, DOP700, EEI707, DMI747, DOP711 - most of these courses are relevant for software developers, architects, information systems specialists;
3) some are too specialized but are fine if core courses are provided.
3a) DMI746 - cybersecurity for High-Performance Solutions is relevant only in very rare cases, and does not overly helpful,
3b) DMI748 - security only for e-commerce.

Several core topics of the domain are not covered at all, e.g. Information Security Management, Privacy, Forensics, Information security risk management, Biometrics, and IoT security. Without these courses, it is very hard if not impossible, to achieve the goals of the program.

Courses, which are mentioned above as irrelevant or partially, could be acceptable, but only if there are free credits left from the compulsory cybersecurity courses.

2.2.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 993-994) and the Annexes to it, and in the interviews conducted during the visit as well. The degree is awarded on the basis of the results of the Master's thesis, which incorporates research activities on current topics in the field of cybersecurity on one hand, and on the results of the examinations in the courses taken. The latter incorporates recent developments and research

results in the field.
2.2.3 The pedagogical methods for delivery of the study courses are selected by the responsible instructors considering the specifics of the study program and student needs. The student-centered nature of the methods used in the program implementation is ensured by means of involving the students in the study process and in the design of the curriculum; taking into account the diversity of the student backgrounds when assigning tasks and selecting educational materials; encouraging and supporting the international mobility of students; offering social support services to the students; implementing a variety of teaching and learning methods; offering a modern learning environment; developing the competences of the academic staff; and offering extracurricular activities.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 Students were first admitted to the program in the academic year 2021/2022. Therefore, no MSc theses have been completed.

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

Conclusions
The content of the study program only partially conforms to the requirements of the cybersecurity program. A number of courses are irrelevant or only partially relevant. The study program aims to meet the needs of the industry and the labor market in terms of technical/scientific knowledge and skills, but the implementation is not. The study program complies with national regulations (state education standards). The study implementation methods contribute partially to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The awarding of a degree is mostly based on the achievements and findings of the relevant field of science.

Strengths:
1. The program aims to meet the needs of the industry.
3. Strong industry collaboration is secured.

Weaknesses:
1. Some courses are irrelevant or less relevant to the field, e.g. DOP700, EEI705, DMI728, DOP724.
2. Some core elements of the field are missing: Information Security Management, Privacy, Forensics, Information security risk management, Biometrics, and IoT security.

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: Partially compliant

The content does not ensure the achievement of the aims of the program and/or its learning outcomes and is unlikely to meet all industry needs in the domain.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state (5 state-funded budget seats) and students fees. In 2021/2022 program funding is 88 934, which is pretty good for the first year of the program. However, in 3-4 years financial performance of the program should be re-evaluated internally to see how it performs.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculty and university. Funding for the first year is sufficient, however, it is to early to make any conclusions on the financing yet.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

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 provisions are sufficiently met to ensure the achievements of the learning outcomes, but in 3-4 years funding of the program should be re-evaluated internally.

2.4. Teaching Staff

Analysis

2.4.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 1003-1007) and the Annexes to it, and in the interviews conducted during the visit as well. In total, 27 members of academic staff are involved in the implementation of the study program; 20 of these hold a Ph.D. Staff members of the following RTU faculties are involved with the implementation of the courses: Faculty of Computer Science and Information Technology; Faculty of Electrical and Environmental Engineering; Faculty of Electronics and Telecommunications; Faculty of Engineering Economics and Management.
Seven members of staff are reported in the SAR as “leading members of academic staff involved in the implementation of the study program”. Of these only, the program director’s research track record is (partly) in the domain of cybersecurity. Another of these members has only a few publications in the area, but the track records of the remaining members are irrelevant to the domain. The qualification of the teaching staff with respect to specific courses in Cybersecurity Engineering are not described in the SAR pp. 1003-1007. As such, the competencies of the teaching staff cannot be established.

2.4.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 1007-1009) and the Annexes to it, and in the interviews conducted during the visit as well. The study program started very recently. Accordingly, In the reporting period, changes in the composition of academic staff have been insignificant. They are mostly related to (a) academic staff being elected to other positions and (b) the attraction of new academic staff for the delivery of the courses. Overall, the academic staff during the reporting period is considered stable. There is no mention of a formal mechanism to ensure that changes in the academic staff will not affect the quality of the specific program. However, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79).

2.4.3 Not applicable

2.4.4 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 1003-1007) and the Annexes to it, and in the interviews conducted during the visit as well. All the members of the teaching staff mentioned in the SAR as being involved with the implementation of the program are active in research and have published in peer-reviewed venues during the last six years.

2.4.5 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 1008-1010) and the Annexes to it, and in the interviews conducted during the visit as well. The academic staff collaborates in delivering the content of the courses, and in improving the curriculum and the delivery procedures. The planning of the courses provides for the successive acquisition of knowledge, and the curricula of the courses are mutually coordinated.

It is planned to promote cooperation among academic staff at the regular (at the beginning of the study year) joint methodological meetings of the academic staff and industry partners, where the content of the program, the succession of the study courses, aims, learning outcomes and their conformity to the newest labor market requirements will be discussed. It planned to organize a methodological meeting of the academic staff after the graduation of the first cohort to update the information on the study courses, to review and coordinate the topics, to avoid, for example, redundancy and overlapping, based on the recommendations of the program management, colleagues and students.
The program supports the participation of lecturers in other lecturers' classes; this promotes the mutual exchange of experience and collegial cooperation. These activities are carried out with the aim to get acquainted with the lecturers' work style in general and the methods of solving relevant pedagogical tasks in classes.

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

Conclusions
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 and the requirements set forth in the regulatory enactments. However, it does not fully enable the achievement of the aims and learning outcomes of the study program. Changes to the composition of the teaching staff till now have not affected the quality of the program. However, an established mechanism for ensuring that changes in the teaching staff to occur in the future will not affect the quality of the implementation of the specific program has not been described in the SAR. Nevertheless, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79). All members of the academic staff in the last six years have published in peer-reviewed editions, including international editions. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has been planned.

Strengths:
1. The teaching staff involved in the implementation of the program are active in research.
2. Mechanisms for facilitating the collaboration of the teaching staff towards ensuring the achievement of the program's aims and the interconnection of the courses exist.

Weaknesses:
1. The ability of the current composition of the teaching staff scheme to achieve the learning outcomes of the program cannot be established since no particular (specific) information is provided in SAR pp. 1003-1007.
2. An established mechanism for ensuring that changes in the teaching staff to occur in the future will not affect the quality of the implementation of the specific program has not been described in the SAR. However, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79).

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: Partially compliant

The ability of the current composition of the teaching staff scheme to achieve the learning

outcomes of the program cannot be established since no particular (specific) information is provided in SAR pp. 1003-1007. An established mechanism for ensuring that changes in the teaching staff to occur in the future will not affect the quality of the implementation of the program has not been described in the SAR.

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 P06 (P06_3.2.1_DMK0(45526)_CompliancewiththeStateEducationStandard_AkadMag_ENG.pdf) confirms that the study program complies with Cabinet Regulation No. 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 (A10_DMK0(45526)_StudyCoursesdescr_ENG.zip) are prepared in English. Descriptions comply with regulations set forth in 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 sample (P28_Diploms_DiplPielikums_LV_Diploma_DiplSupl_ENG.zip) complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet Regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Apliecinājums - valsts valodas zināšanas.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Apliecinājums - svešvalodu prasme.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic master study program “Computer Systems”.

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program fully complies with regulatory enactments.

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from a bachelor's program in Engineering Science or similar.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

The content of the study program is topical and many, but not all of the courses are relevant. The study program aims to meet the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods partially contribute to achieving the aims and learning outcomes of the study courses and the program. Student-centered learning and teaching principles are considered but not always employed. The awarding of a degree is mostly based on the achievements and findings of the relevant field of science.

The program is well supported by the faculty and university. Funding for the first year is sufficient, however, it is too early to make any conclusions on the funding yet.

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 and the requirements set forth in the regulatory enactments. However, it does not fully enable the achievement of the aims and learning outcomes of the study program. Changes to the composition of the teaching staff

till now have not affected the quality of the program. However, an established mechanism for ensuring that changes in the teaching staff occur in the future will not affect the quality of the implementation of the specific program has not been described in the SAR. Nevertheless, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79). All members of the academic staff in the last six years have published in peer-reviewed editions, including international editions. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has been planned.

Overall, such a program is needed and the idea of the program is supported by the industry, however, implementation of the program is highly problematic, i. e. core courses and elements, necessary for cybersecurity are missing, e.g., Information Security Management, Privacy, Forensics, Information security risk management, Biometrics, IoT security, etc. Without these topics, the program does not provide sufficient competencies to become cybers

Strengths:
1. The teaching staff involved in the program implementation are active in research.
2. Mechanisms for facilitating the collaboration of the teaching staff towards ensuring the achievement of the program's aims and the interconnection of the courses exist.
Strengths:
3. High demand for specialists in the industry, and good perspectives for them in terms of income.
4. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
5. The program aims to meet the needs of the industry.
6. Strong industry collaboration is secured.

Weaknesses:
1. The ability of the current composition of the teaching staff scheme to achieve the learning outcomes of the program cannot be established.
2. An established mechanism for ensuring that changes in the teaching staff occur in the future will not affect the quality of the implementation of the specific program has not been described in the SAR. However, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79).
3. Some courses are irrelevant or less relevant to the field.
4. Some core elements of the field are missing (g. Information Security Management, Privacy, Forensics, Information security risk management, Biometrics, IoT security, etc.).

Evaluation of the study programme "Cybersecurity Engineering"

Evaluation of the study programme:

Average

2.6. Recommendations for the Study Programme "Cybersecurity Engineering"

Short-term recommendations

1. Relevant (and fundamental) cybersecurity courses should be introduced.
2. Staff with relevant competencies should be involved in teaching.

Long-term recommendations

1. The overall program needs to be reworked to lead to the achievement of its objectives, the stated learning outcomes, and the current and future industry needs.
2. In view of the findings in 2.4.1 and 2.4.2 above, considerable changes need to be made to the composition of the teaching staff team implementing the program, to match the changes in the content that will be necessary in order to focus and sharpen its relevance to the cybersecurity domain.
3. A formal mechanism for ensuring that changes in the composition of the teaching staff team will not affect the quality of the specific program needs to be established and followed.

II - "Logistics and Supply Chain Management" ASSESSMENT

II - "Logistics and Supply Chain Management" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The study program's contents are engineering-oriented, paying special attention to engineering solutions and technologies used in the logistics systems and supply chains field. (SAR, p. 693) Most of the courses of the program (Annex P09_3.2.1_DML0(45526)_Plans_lv_Plan_eng.pdf) cover topics of ICT, thus making the program an engineering program and compliant with the field.

2.1.2. Interrelation of parameters of the study program.
The title of the study program is Logistics and Supply Chain Management. The title of the program should accurately reflect the strong IT focus of the program, also by the content (curriculum) of the program it can be observed that program includes high ratio of ICT part against logistics part.
The code of the study program is 45526 which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `45` notes that this study program is an academic master program and the last three digits `526` indicate that this study program is related to the educational group of “other engineering sciences. Of course, the name of the degree could be harmonized with the study program code ensuring their compliance with the content of the study program.
The degree to be acquired: Master's Degree of Engineering Science in Logistics and Supply Chain Management.
The 7 tasks (objectives) of the program correspond to the goal to educate professionals able to understand and implement logistics systems technology, as well as identify, analyze and solve problems in logistics systems and supply chains, related to their design, implementation, operation, and management, including logistics information technology and systems.
The results of the study program (learning outcomes) are adequate (13 outcomes) for the academic master's degree and comply with the aim and objectives of the study program. Learning outcomes include both aspects of ICT and logistics with an emphasis on ICT.
Admission requirements (Bachelor's Degree of Engineering Science, or comparable education) are adequate.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (1 implementation variant) –
* Full-time studies with a duration of 2 years (80 CP/120 ECTS) implemented in English.

Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. Admission requirements have been changed to harmonize them with other programs within the study field (SAR, p. 692) and are supported.

2.1.4. Logistics and supply chain management is a rapidly growing field in Latvia and worldwide. (SAR, pp. 693, 694)
Graduates of the study program work in logistics and supply chain companies (e.g., Printify, Roche, Astra Zeneca). Highly-qualified specialists who are able to manage complex processes, and implement and maintain appropriate IT solutions for supporting logistics and supply chain management processes are critically important in the field. (SAR, p. 694)
According to P05_3.1.4_DML0(45526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, in recent years, the annual number of admitted students 9-38, making the total actual number of students in the program 9-79, while the annual number of graduates is 3-21 with a positive overall tendency of growth.
Most students are self-paid.

2.1.5. Not applicable

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

Conclusions
The study program's aim, tasks, and learning outcomes are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are entirely in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from a bachelor's program in Engineering Science or similar.
The code and degree of the program and match the program, while the title does not correspond to the strong emphasis on IT.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.

Weaknesses:
1. The name of the degree should be overviewed harmonizing with the study program code ensuring compliance with the content of the study program.
2. The title of the program should indicate focus on IT.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 696-699) and the Annexes to it, as well as in the interviews conducted during the visit. The aim of the program is to educate and train highly qualified specialists that understand and are able to implement logistics system technologies; identify, analyze, and solve problems in the field of logistics systems and supply chains related to designing, implementing, operating, and managing logistics systems and supply chains also in the field of information technologies and systems; as well as to develop the student ability to carry out scientific research; take part in local and international projects; and continue studies at the Ph.D. level.

The volume of the program is 80 CP. This breaks down into compulsory courses in Part A (36 CP); compulsory elective courses in Part B (24 CP); and Master Thesis (20 CP). The compulsory courses of the program offer deeper theoretical knowledge in logistics systems and supply chain management, as well as promote the development of research skills necessary for obtaining the academic Master's degree. However, the students are not sufficiently motivated to pursue doctoral studies. Specialization courses (Part B, Section B1) form the knowledge base for the application of information technology in the management of logistics systems and supply chains or the technology and implementation of logistics systems. Courses that are included in Part B2 allow students with engineering education to supplement their knowledge in the field of business organization and international economic communication; students with education in economics or management can supplement their knowledge of technologies. However, students with an operational background face difficulty in following IT classes. The title of the program should accurately reflect the strong IT focus of the program.
Annex 8 P08_3.2.1_DML0(45526)_Kartejums_lv_Mapping_eng.pdf provides a comprehensive overview of the program's structure and the mapping of the objectives and learning outcomes to courses.
The industry representatives that the committee met with were satisfied with the extent to which the program meets their needs. The need for enhanced soft skills among graduates has been noted by employers.

2.2.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 699-700) and the Annexes to it, as well as in the interviews conducted during the visit. The degree is awarded on the basis of the results of the Master's thesis, which incorporates research activities on current topics mostly in fields relevant to IT and information systems on one hand, and on the results of the examinations in the courses taken. The latter incorporates recent developments and research results in the field. Examples are provided in the SAR (p. 699).

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 700-704) and the Annexes to it, as well as in the interviews conducted during the visit. The pedagogical methods for delivery of the study courses are selected by the responsible instructors considering the specifics of the study program and student needs. The student-centered nature of the methods used in the program implementation is ensured by means of involving the students in the study process and in the design of the curriculum; taking into account the diversity of the student backgrounds when assigning tasks and selecting educational materials; encouraging and supporting the international mobility of students; offering social support services to the students; implementing a variety of teaching and learning methods; offering a modern learning environment; developing the competences of the academic staff; and offering extracurricular activities.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 704-706) and the Annexes to it, and in the interviews conducted during the visit as well. During the reporting period, 88 Master Theses have been presented. Amongst them, both scientifically oriented works and works developed in collaboration with a company are found. Many students did their thesis in foreign universities within the framework of an ERASMUS+ student exchange program. The topics of theses include those that are especially relevant nowadays, for example, the effects of the COVID pandemic on logistics systems and supply chains, green logistics and use of the internet of things, as well as topics that are historically related to logistics and supply chain problem

solving, for example, simulation, optimization, system automation, etc.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market's needs regarding technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to achieving the aims and learning outcomes of the study courses and the program. Student-centered learning and teaching principles are considered but not always employed. The awarding of a degree is based on the achievements and findings of the relevant field of science. The topics of students' Master's theses are relevant to the area and correspond to the study program.

Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market's needs regarding technical knowledge and skills.
5. The topics of the Master's thesis are relevant to the program.

Weaknesses:
1. The focus of the program on IT is too strong and should be emphasized in programs title.
2. The soft skills of the graduates need further enhancement.
3. Student-centered teaching and learning approaches are not employed in full.

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

All the criteria are satisfied, but the title of the program does not reflect the emphasis on information technologies

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the excellent implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
The program is supported by several faculties: Computer Science and Information Technology,

Engineering Economics and Management, and Faculty of Mechanical Engineering, Transport, and Aeronautics.
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
In addition, students get access to specialized logistics systems and supply chain environments that ensure the implementation of an active learning approach: the Fresh Connection, International Management Game, ECLIPS, BeerGame, Traffic system simulation modeling tool Aimsun, Geographical information system (GIS) software ArcGIS, specialized simulation software systems ARENA, Simul8, MATLAB.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program students (mostly foreign) fees. From 2014 the funding has grown from 2 853 to 110 767 Euro. The program is sustainable, but the 2020/2021 funding drop should be analyzed, and the program should be monitored.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility of ensuring a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculties and university, and popular among foreign students. Current funding is sufficient, but high inflation may require looking for means to increase it.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

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 provisions are sufficiently met to insure the achievements of the learning outcomes. Funding is sufficient, but plans to increase it should be prepared.

2.4. Teaching Staff

Analysis

2.4.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 710-716) and the Annexes to it, and in the interviews conducted during the visit as well. In total, 28 members of academic staff are involved in the implementation of the study program; of these 24 hold a Ph.D. Staff members of the following RTU faculties are involved with the implementation of the courses: Faculty of Computer Science and Information Technology; Faculty of Engineering Economics and Management; Faculty of Mechanical Engineering, Transport, and Aeronautics.
Ten members of staff are reported in the SER as "leading members of academic staff involved in the implementation of the study program". The research track records of all these are in domains very relevant to information technology, engineering, information systems, economics, and social sciences. Few members with track records in management sciences, including logistics, exist.
2.4.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 716-717) and the Annexes to it, and in the interviews conducted during the visit as well. In the reporting period, changes in the composition of academic staff are mostly attributed to the (a) replacement of the study courses at the study program; (b) retirement of academic staff or workplace change, and (c) attraction of new qualified academic staff for delivery of the study courses. The total number of academic staff involved with the implementation of the program has increased in the reporting period. A formal mechanism for ensuring that changes in the composition of the teaching staff will not adversely affect the quality of the specific program has not been described in the SAR. However, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79).

2.4.3 Not applicable

2.4.4 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 710-716) and the Annexes to it, the CVs of the members of teaching staff (retrieved from the internet), and in the interviews conducted during the visit as well. All the members of the teaching staff mentioned in the SAR as being involved with the implementation of the program are active in research and have published in peer-reviewed venues during the last six years.

2.4.5 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 718-719) and the Annexes to it, and in the interviews conducted during the visit as well. The academic staff collaborates in delivering the content of the courses, and in improving the curriculum and the delivery procedures. The planning of the courses provides for the successive acquisition of knowledge, and the curricula of the courses are mutually coordinated.
Mutual experience exchange among academic staff takes place at FCSIT and ITI methodological seminars (at the beginning of the study year), regular methodological meetings of the program's academic staff and industry partners, as well as LSCM methodological conferences organized by RTU in collaboration with partners from UAB (Spain) and UASW (Germany). Three methodological conferences were organized (Faculty Conference on Logistics and Supply Chain Management), providing a forum for discussions on the program curriculum, sequence of the study course, aims, learning outcomes, and their conformity to the recent labor market requirements.
The program supports the participation of lecturers in other lecturers' classes; this promotes the

mutual exchange of experience and collegial cooperation. These activities are carried out with the aim to get acquainted with the lecturers' work style in general and the methods of solving relevant pedagogical tasks in classes.

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

Conclusions
The qualifications of the teaching staff team are mostly commensurate with the needs of the program. However, teaching staff with expertise in the management (operational) aspects of logistics and supply chain management (cf section on content above) are missing. Changes to the composition of the teaching staff till now have not affected the quality of the program. However, an established mechanism for ensuring that changes in the teaching staff occur in the future will not affect the quality of the implementation of the specific program has not been described in the SAR. Nevertheless, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79). All members of the academic staff in the last six years have published in peer-reviewed editions, including international editions. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program exists.

Strengths:
1. The teaching staff involved in the implementation of the program are active in research.
2. Mechanisms for facilitating the collaboration of the teaching staff towards ensuring the achievement of the program’s aims and the interconnection of the courses exist.

Weaknesses:
1. Balance of teaching staff in IT and the management is unbalanced w.r.t. program title, i.e. while the program is called “Logistics and supply chain management”, the main emphasis of the program is computer science (the program is led by CS department and evaluated as CS program).
2. An established mechanism for ensuring that changes in the teaching staff occur in the future will not affect the quality of the implementation of the program has not been described.

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: Partially compliant

Most, but not all of the criteria are satisfied, i.e. logistics are not reflected sufficiently in the program, it is mostly IT studies.

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 P06 (P06_3.2.1_DML0(45526)_AtbilstibaValstsStandartam_AkadMag_LV.pdf) confirms that the study program complies with Cabinet Regulation No. 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 (A10_DML0(45526)_StudyCoursesdescr_ENG.zip) are prepared in english. Descriptions complies with regulations set forth in 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 sample (P28_Diploms_DiplPielikums_LV_Diploma_DiplSupl_ENG.zip) complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached resumes of staff and RTU confirmation letter (Apliecinājums - valsts valodas zināšanas.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Apliecinājums - svešvalodu prasme.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic masters study program "Information Technology"

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

RTU confirmation (Apliecinājums - par zaudējumu kompensāciju.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program fully complies with regulatory enactments.

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

The study program's aim, tasks, and learning outcomes are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are entirely in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from a bachelor's program in Engineering Science or similar.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market's needs regarding technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The study implementation methods contribute to achieving the aims and learning outcomes of the study courses and the program. Student-centered learning and teaching principles are considered but not always employed. The awarding of a degree is based on the achievements and findings of the relevant field of science. The topics of students' Master’s theses are relevant to the area and correspond to the study program.

The program is well supported by the faculties and university, and popular among foreign students. Current funding is sufficient, but high inflation may require looking for means to increase it.

The qualifications of the teaching staff team are mostly commensurate with the needs of the program. However, teaching staff with expertise in the management (operational) aspects of logistics and supply chain management (cf section on content above) are missing. Changes to the composition of the teaching staff till now have not affected the quality of the program. However, an established mechanism for ensuring that changes in the teaching staff occur in the future will not affect the quality of the implementation of the specific program has not been described in the SAR. Nevertheless, mechanisms for ensuring the sufficiency of human resources at the RTU level are described (e.g., SAR, pp. 75-79). All members of the academic staff in the last six years have published in peer-reviewed editions, including international editions. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program exists.

Strengths:
1. The teaching staff involved in the implementation of the program are active in research.
2. Mechanisms for facilitating the collaboration of the teaching staff towards ensuring the achievement of the program’s aims and the interconnection of the courses exist.
3. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
4. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.

5. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
6. The program meets the needs of the industry and the labor market's needs regarding technical knowledge and skills.
7. The topics of the Master's thesis are relevant to the program.
8. High demand for specialists in the industry, and good perspectives for them in terms of income.

Weaknesses:
1. Teaching staff with expertise in the management (operational) aspects of logistics and supply chain management (cf section on content above) are missing.
2. An established mechanism for ensuring that changes in the teaching staff occur in the future will not affect the quality of the implementation of the program has not been described.
3. The title of the program should accurately reflect the strong IT focus of the program.
4. Student-centered teaching and learning approaches are not employed in full.
5. The name of the degree should be harmonized with the study program code ensuring compliance with the content of the study program.

Evaluation of the study programme "Logistics and Supply Chain Management"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Logistics and Supply Chain Management"

Short-term recommendations

1. Involve teaching staff with expertise in management (operational) aspects of logistics and supply chain management.
2. Better inform students about programs' goals and curricula.
3. Review the title of the program assuring that title accurately reflect the strong IT focus of the program.

Long-term recommendations

1. Improve program description to reflect emphasis on the IT, or revisit the content of the program, to achieve a better balance between IT and management (operational) aspects of logistics and supply chain management
2. Include activities to enhance the students' soft skills.
3. Student-centered teaching and learning methods need to be employed in all courses.
4. A formal mechanism for ensuring that changes in the composition of the teaching staff team will not affect the quality of the specific program needs to be established and followed.
5. The name of the degree should be harmonized with the study program code ensuring compliance with the content of the study program.

II - "Telecommunication Technologies and Networks Management"

ASSESSMENT

II - "Telecommunication Technologies and Networks Management" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. According to the self-assessment, the study program is implied (not stated clearly) to be in compliance with the study field. The study program is suitable for the study field. The study program title and contents are suitable for the study field. According to the SAR, the study program is developed taking into account RTU strategic objectives, market offers, and potential demands. The study program is elaborated according to the RTU strategy and the study field. The SAR states that the acquisition of knowledge and skills anticipated in the study program is provided by the academic staff and scientists of the European level, who are involved in professional state and international level expertise on a regular basis as well as have high qualifications with many years of experience.

2.1.2. According to the SAR, the objective of the study program is to prepare specialists who are characterized by the ability to think systematically, analyze, develop and implement engineering solutions, as well as manage telecommunication systems. In addition, to develop students' ability to perform scientific work, participate in local and international projects and continue doctoral studies. The SAR declares that the students are provided with in-depth academic, practical, and professional knowledge in the fields of telecommunications management, fiber optics, wireless transmission, and information technology. The outcome of the program is graduates who are able to independently formulate and analyze scientific and professional problems in the telecommunication technologies and networks management sector, manage telecommunication networks and understand their processes, conduct scientific research, formulate and substantiate its results, adapt and learn new research methods and technologies, professionally design, submit and present the results of scientific research, participate in research projects and assist in pedagogical work, prepare scientific articles and conference presentations, apply methods and tools in telecommunication system management, analysis, and modeling tasks and solutions, organize and lead a technologies' developer working groups, delegate work tasks, control their execution, and analyze the results. The duration of the study program is 2 full years and the scope is 80 CPs. The obtained degree is a Master's degree in Engineering Science in Telecommunication Technologies and Networks Management. The study languages of the study program are English and Latvian. The eligible students for enrolment are required to have a Bachelor's Degree of Engineering Science in Telecommunication Engineering, or a comparable education and English language proficiency equivalent to at least CEFR B2 level. The title, code, degree to be obtained, aims, objectives, learning outcomes, and admission requirements are interrelated. The objective of the program is to prepare experts with systematic thinking. The aim is also to prepare students for scientific work, participation in local and international projects, and continuation of studies in the doctoral study program. The full scope of the study program is 80 CP and the duration of implementation is 2 years which is the expected duration and scope to allow covering the skills and knowledge defined in the study program. The awarded degree is a Master’s Degree in Engineering Science in Telecommunication Technologies and Networks Management. The duration and scope and implementation are reasonable and justified.

2.1.3. According to the SAR (pages 163-164), several changes have been made to the study program since the issuance of the previous accreditation of the study field. Some of the changes are listed in the following sentences. The program is managed by a new study program director. The volume of the study program has been reduced from 82 CP to 80 CP. The title of the academic study program is changed from “Telecommunication” to “Telecommunication Technologies and Network

Management". The program code has been changed to 45526 ("Other engineering sciences"). This is a common question to multiple study programs whether the classification codes should be amended to allow more descriptive classification of the programs in the study field. The admission requirements have been changed to be more in line with the Telecommunication field. The volume of the compulsory part has been reduced from 40 CP to 34 CP. The volume of the compulsory elective part is increased from 18 CP to 22 CP and the professional specialization from 14 CP to 18 CP. The changes aim to improve the study process and the quality, taking into account the recommendations from enterprises and associations of the field. The changes seem to be analyzed and supported by the study program team led by the new study program professor V. Bobrovs.

2.1.4. According to the self-assessment report (pages 167-168), 95% of the graduates work in parallel with their studies. The study program graduates are expected to work as directors, senior experts, engineers, planners in telecommunication and ICT enterprises, and data transmission infrastructure specialists among other jobs. The self-assessment report does not provide any concrete statistics regarding the graduates. The number of students enrolled in the first year has been declining which might merit a plan to increase the number of students that might be out of scope for the study program and study field since the self-assessment report states that the underlying problem might be rooted in the industry and demographic situation. The exmatriculation reasons relating to academic failure should be addressed but this could also be related to the previous problem with the industry needs and demographic situation - students can already find suitable employment without graduating and therefore give up more easily. Still, additional support systems could be considered to improve student retention.

2.1.5. Not applicable

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

Conclusions
The study program complies with the study field.
The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation, as well as the implementation language, are sufficiently reasonable and justified.
The corrections made to the study program's parameters within the assessment of the study field are sufficiently analyzed, and justified, and would be supported.
Economic and/or social justification of the study program, dynamics of the number of students, and employment indicators of the graduates of the study program are sufficiently reasonable.

Strengths:
1. Numerous recent changes indicate the aim to improve the study program. The study program has been changed to be more flexible which is generally a positive thing.

Weaknesses:
1. The declining number of students can be considered a weakness and its solutions should be analyzed in more depth at the university and state levels. RTU and study field-related staff should analyze whether the declining numbers are correlated to university and state trends.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 170-173) and the Annexes to it, and in the interviews conducted during the visit as well. The aim of the program is to prepare specialists able to think systematically, analyze, develop and implement engineering solutions, as well as manage telecommunication systems. In addition, to develop the student's ability to perform scientific work, participate in local and international projects and continue their education by pursuing doctoral study. The students are provided with in-depth academic, practical, and professional knowledge in the fields of telecommunications management, fiber optics, wireless transmission, and information technology.
The volume of the program is 80 CP. The anticipated volume of compulsory courses in the program is 34 CP. These courses provide knowledge in the field of telecommunication technologies and network management, develop knowledge about topical problems of the telecommunication fields, and include knowledge about scientific research methods and their application thereof. The compulsory elective (specialization) courses of the study direction (18) are anticipated for potential students to be able to deepen their knowledge in the chosen specialization field. There are also humanities and social sciences courses in the program (4 CP), as well as free optional courses (4 CP). The program finishes with a master's thesis (20 CP).
Lecture courses are generally theoretical, where research elements are embedded for students in the form of theses, research, and other independent works. The orientation of practical classes is individual, where within a common topic each student elaborates on an individual study project. Acquisition of knowledge, skills, and competencies in special subjects is monitored in the form of individual consultations. Attendance of practical classes is compulsory for all students during the whole period of study.

2.2.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 174-175) and the Annexes to it, and in the interviews conducted during the visit as well. The final requirement for obtaining the degree is the writing and defending of a Master's thesis. The thesis and its defense demonstrate the student's ability to analyze, classify, and compare the ideas presented in the scientific and technical literature in selected fields of telecommunication engineering. The degree is awarded on the basis of the results of a reviewed theoretical and/or practical research (Master Thesis) public defense and the examinations within the courses. Additionally, the academic staff and students of the study program regularly carry out research and participate in scientific projects, thus the content of the program is up-to-date with respect to recent developments in the fields of interest.

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 175-177) and the Annexes to it, and in the interviews conducted during the visit as well. The study process is organized in the form of lectures, laboratory work, and practical work so that the students acquire both theoretical and practical knowledge. Various methods are used: lectures, seminars, presentations, group works, discussions, situation analysis, solving practical tasks to strengthen knowledge, and control tests - to test knowledge. In order to inform the students about the latest trends in the industry, guest lectures by industry experts and company representatives are held regularly.
The students are provided with the opportunity to influence their own study process, implement their own autonomy, and submit feedback on the study process by combining it with their own professional growth interests.
The achievable learning outcomes are discussed with the students at the beginning of each course, and also such information is available in the ORTUS environment. A linkage is provided between the achievable results of the program and those of the courses. According to the achievable results of the program, content and volume in credit points of courses are created, and in turn, according to the achievable results of each course, topics and volume thereof are created. In all courses, the

achievable results are verified with appropriate assessment methods.
In order to ensure student-centered education, the students are offered a relatively high degree of autonomy in the development of independent work, implementation of specific undergraduate paper research, and the choice of a particular major, as well as in group work; this to a large extent also allows the manifestation of organizational skills, leadership qualities, and other transdisciplinary skills.

2.2.4 Not applicable

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 178-182) and the Annexes to it, and in the interviews conducted during the visit as well. Topics of the student's master's theses are offered by the staff of the program, the RTU ETF Institute of Telecommunication, and can also be chosen independently by the students, according to their own interests, following consultation with the teaching staff. The objective of the master's thesis is to provide the student with the opportunity to solve research tasks on the basis of the knowledge acquired during their studies, to make decisions in a reasonable way, to logically sequentially and reasonably express and present their results by demonstrating the ability to perform scientific work and discussion at high professional level in the field of telecommunications. The students can present their research works at student conferences. The final examination commission of RTU FET Institute of Telecommunications evaluates the participation of students in scientific and research activities (conferences, publications), assigning higher marks for this. For example, in 2017 at the student conference, 6 students took part, in 2018 – 2 students, in 2019 – 5 students, in 2020 – 5 students, and in 2021 – 6 students.
The SAR includes a list of all master's theses topics in the period of the evaluation. These are all relevant to the field and to the content of the program.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The awarding of a degree is based on the achievements and findings of the relevant field of science. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The topics of students' Master's theses are relevant to the field and correspond to the study program.

Strengths:
1. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The teaching and learning methods employed are student-centered.
5. The topics of the Master's thesis are relevant to the program.

Weaknesses:
1. Student-centered teaching and learning approaches are not employed in full.

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

All criteria are satisfied.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
The program uses FET labs, such as Electrical Measurements Student Laboratory, Transmission Systems, and Access Networks Student Laboratory, Telecommunications Theory Measurement Student Laboratory, Digital Devices and Systems Student Laboratory, Digital Electronics and Computer Architecture Student Laboratory, Transmission Media Student Laboratory, Class of Communication Systems and Telecommunication Networks Mathematical Modelling, Transport Network Performance Assessment and Radio Navigation Laboratory, Transport Electronics Laboratory. However, some labs are rather small and are not easy to access for first-year students.
According to SAR (section 3.3.3) the program is mostly funded by the state. It is sufficient for the program. However, funding drop from ~437 thousands in 2018/2019 to ~371 thousands in 2019/2020 and 2021.2022.
Experts consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during a visit to RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported, and funding is sufficient, but funding drop from ~437 thousands in

2018/2019 to ~371 thousands in 2019/2020 and 2021/2022 should analyzed and potential risks mitigated.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses
1. Some laboratories have limited access to younger students.
2. Students of this program do not have access to EDUROAM, in contrast to all other students of the RTU.
3. Student of this program do not have access to the most computational resources, which other students have.

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 provisions are sufficiently met to insure the achievement of the learning outcomes. Labs and databases should be made more accessible to all students. Funding fluctuations are too high and should be mitigated.

2.4. Teaching Staff

Analysis

2.4.1. The qualification of the teaching staff members involved in the implementation of the study program complies with the requirements stated in the relevant regulation and that in general enables the achievement of the aims and learning outcomes of the study program.
According to SAR 3.4.1, in the implementation of the Academic master study program "Telecommunication Technologies and Networks Management," 29 academic staff are involved in total - 7 professors, 3 associated professors, 9 docents and 7 lecturers, 2 senior researchers (guest associate professors), and 1 scientific assistant. The study program is mostly implemented by RTU FET Institute of Telecommunications.
Students are highly satisfied with the performance of the academic staff as well as with the knowledge acquired.
The teaching staff is selected according to (1) their knowledge of the study field; (2) their pedagogical skills; (3) their experience in teaching foreign students in English.
According to the study visit insights development of pedagogical competencies is taken care of but in some aspects too narrow (related mostly to new technology and e-learning) lacking learning design and student-centered teaching and learning approaches based on learning outcomes applications.

2.4.2. As explained in the SAR 3.4.2. the faculties and the institute purposefully take measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation
The composition of the academic staff has changed during the reporting period due to the new requirements of the field and interdisciplinary approach. Therefore the effort has been taken to

attract new instructors, including Ph.D. students in telecommunications and network management as well as young teachers with international educational and professional experience.

2.4.3. not applicable

2.4.4. Members of the academic staff in the last six years have published in peer-reviewed editions or have five years of practical experience in accordance with the Law requirements.
In SAR 3.4.1 it is stated that the qualification of the teaching staff involved in the implementation of the study program fully corresponds to the requirements of the normative acts (verified in the CVs of the teaching staff).

2.4.5. A mechanism for mutual cooperation (described in SAR 3.4.5) of the teaching staff in the implementation of the study program has been established and can ensure the achievement of the aims of the study program and the interconnection of study courses within the study program.
Internationally experienced staff and visiting professors contribute to the quality of the study program and its delivery.
There are regular faculty meetings to share experiences and several technologically supported advancements have been introduced.
The SAR reported that the student-to-faculty staff ratio is kept consistently low (3 students for one elected member of the teaching staff) so that they can provide individual counseling and feedback. The balance of the teaching load is also monitored.

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

Conclusions
The teaching staff is qualified and students are satisfied with their delivery.
An effort has been taken to attract new instructors, including Ph.D. students.
Mutual cooperation of teaching staff is supported and internationally experienced staff is involved.

Strengths:
1. Teachers from different faculties cooperate on this study program and academic teaching staff and qualified experts from various fields are involved in the implementation of the study program.
2. The effort has been taken to attract new teaching staff, including Ph.D. students in telecommunications and network management as well as young teachers with international educational and professional experience.
3. Internationally experienced staff and visiting professors contribute to the quality of the study program and its delivery.
4. Qualification of the teaching staff involved in the implementation of this academic master study program fully corresponds to the study program implementation requirements as well as with the normative acts.
5. Provision of seminars and training for teaching staff which may support also mutual cooperation among the teaching staff within the study program
6. Teaching staff together with students and administration participate in the regular study program analysis.

Weaknesses:
1. The professional development of teaching staff related to learning design and student-centered teaching and learning approaches based on learning outcomes applications has not been reported.
2. The situation with teaching staff is reported as satisfactory but the mid-term and long-term plan

for staff attraction and development is not reported to exist (it will be useful).

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

All the standards are fulfilled and there are no major shortcomings. Minor weaknesses are related to the professional development of teaching staff about the student-centered approach and personal plan development.

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 Annex P06_3.2.1_EMC0(45526)_AtbilstibaValstsStandartam_AkadMag_LV.pdf describes the correspondence of the program to “Cabinet Regulation No. 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

The Annex P10_EMC0(45526)_StudijuKursuapraksti_LV.zip provides the required description of all courses of the program both in Latvian and in English. Descriptions comply with regulations set forth in 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 Annex P28_3.1.2_EMC0(45526)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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 annex Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc provides the information that at least five professors and associate professors take part in the implementation of the compulsory part and the limited elective part.

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

Clause has been removed from law as of 14.07.2022.
Still, there are less than 250 full-time students in the program, and the report (Nr_38_RTU_mg_250_stud_Telekomunik.edoc) provides confirmation of a relevant opinion of the Council of Higher Education, as well as information that at least five professors and associate professors who take part in the implementation of the compulsory part and the limited elective part.

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

Attached resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation.. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and the RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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 annex (P15_2.1.4_StudijuTurpin_StudyContinue.zip) provides information that the student can continue studies in RTU professional master study program “Smart electronic systems”

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 report (annex P06 for the program) describes the correspondence of the program to “Environmental Protection Law”, and “Civil Protection Law”

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

All the requirements are satisfied

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

The title, code, degree to be obtained of the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation, as well as the implementation language, are sufficiently reasonable and justified. The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards).The program is well supported, and funding is sufficient, but funding drop from ~437 thousands in 2018/2019 to ~371 thousands in 2019/2020

and 2021/2022 should analyzed and potential risks mitigated. The teaching staff is qualified and students are satisfied with their delivery. An effort has been taken to attract new instructors, including Ph.D. students. Mutual cooperation of teaching staff is supported and internationally experienced staff is involved.

Strengths:
1. Teachers from different faculties cooperate on this study program and academic teaching staff and qualified experts from various fields are involved in the implementation of the study program.
2. Therefore the effort has been taken to attract new instructors, including Ph.D. students in telecommunications and network management as well as young teachers with international educational and professional experience.
3. Internationally experienced staff and visiting professors contribute to the quality of the study program and its delivery.
4. Qualification of the teaching staff involved in the implementation of this academic master study program fully corresponds to the study program implementation requirements as well as with the normative acts.
5. Provision of seminars and training for teaching staff which may support also mutual cooperation among the teaching staff within the study program
6. Teaching staff together with students and administration participate in the regular study program analysis.
7. Numerous recent changes indicate the aim to improve the study program. The study program has been changed to be more flexible which is generally a positive thing.
8. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
9. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
10. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
11. The teaching and learning methods employed are student-centered.
12. The topics of the Master's thesis are relevant to the program.
13. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses:
1. The professional development of teaching staff related to learning design and student-centered teaching and learning approaches based on learning outcomes applications has not been reported.
2. The situation with teaching staff is reported as satisfactory but the mid-term and long-term plan for staff attraction and development is not reported to exist (it will be useful).
3. The declining number of students can be considered a weakness and its solutions should be analyzed in more depth at the university and state levels. RTU and study field-related staff should analyze whether the declining numbers are correlated to university and state trends.
4. Student-centered teaching and learning approaches are not employed in full.
5. Some laboratories have limited access to younger students.
6. Funding drop should analyzed and potential risks mitigated.

Evaluation of the study programme "Telecommunication Technologies and Networks Management"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Telecommunication Technologies and Networks Management"

Short-term recommendations

1. The professional development of teaching staff related to learning design and student-centered teaching and learning approaches based on learning outcomes might be needed and it is recommended to implement.
2. The situation with teaching staff is reported as satisfactory but the mid-term and long-term plan for staff attraction and development will be useful.
3. Student-centered teaching and learning methods need to be employed in all courses.
4. The declining number of students can be considered a weakness and its solutions should be analyzed in more depth at the university and state levels. RTU and study field-related staff should analyze whether the declining numbers are correlated to university and state trends.
5. Ensure access for the students of this particular program to EDURAOM.
6. Ensure access for the students of the program access to the same resources as all RTU students.

Long-term recommendations

1. Labs should be made easy to access for all the students.
2. Funding fluctuation risks should be mitigated.

II - "Information Technology Project management" ASSESSMENT

II - "Information Technology Project management" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The professional master study program “Information Technology Project Management” is part of the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”, for which it is a perfect fit. The program is fully compliant with the study field.

2.1.2. The professional master study program “Information Technology Project Management” is coded as 47483 – educational program group “Computer systems, databases, and computer networks”; the degree issued upon graduation is Professional Master's Degree in Information Technology. The study program offers three variants for completion based on the previous education and experience of the student: 2 years (80 credit points = 120 ECTS), or 1 year and 6 months (60 credit points); or 2 years and 6 months (100 credit points); the teaching language is Latvian. The qualification to be obtained is “Information Technology Project Manager”. The admission requirements are formulated by the university's “Admission Regulations for Higher Level Academic and Professional Study Programs” (approved by the RTU Senate Decision No. 655). According to the SAR pp. 204, admission is competitive, candidates are ranked according to their weighted grade average from the bachelor studies, and “individual discussions are carried out with the applicants in order to evaluate the previously acquired competencies and recommend them the most appropriate

study program implementation variant."
The declared goal of the program is "To educate and train IT specialists competitive in the global labor market with in-depth knowledge in IT project managers who are able to analyze, select, plan, create, integrate, implement and maintain user-friendly IT solutions for the achievement of business goals of companies and organizations", which seems appropriate and justified in relations with the code, duration, and qualifications of the program.
The title of the study program precisely characterizes the study field, the goal, and the outcomes of the study program. Graduates of the study program work as IT project managers, professions in specializations such as SCRUM team captains, or related professions, such as IT consultants, system analysts, IT security managers, or product managers.

2.1.3. During the period from the last external evaluation, three corrections have been performed in the parameters of the study program.
The classification code of the study program has been changed. During the previous accreditation period, the study program code was 47481. The change of this code is provided for in the Cabinet Regulation No. 322 of 13 June 2017. The most appropriate code for the study program is Computer Systems, Databases, and Computer Networks (code 47483). Information technology project management covers various ICT industry projects and looks at different ICT solutions in general, creating complex engineering computer systems.
The name of the program has been changed by adding "Project Management" and linking the curricula to the professional standard of "Information Technology Program Manager".
The implementation of the study program has been expanded to offer 3 (three) different implementation variants with different duration, volumes (number of credit points (CP), and admission requirements; changes have been made to the volume of the existing variants and admission requirements. The study program is offered in the following variants:
1) Variant 1 (100 CP, duration 2 years 6 months).
2) Variant 2 (60 CP, duration 1 year 6 months). Changes in the volume of the variant have been made during the reporting period – the volume has been reduced from 62 CP to 60 CP. The changes have been implemented due to the consolidation of study courses in Part A of the program (combined content-wise similar courses).
3) Variant 3 (80 CP, duration 2 years). A new version has been created.
The admission requirements have been also changed, such that the number of potential candidates that can address the master program increases; the changes are explained in the SAR pp. 202, as follows:
1) Variant 1 (100 CP, duration 2 years 6 months) – applicants need a Bachelor's degree if they have acquired study courses in the field of natural sciences and information technology in the volume of at least 20 CP in the study program and/or as a listener.
2) Variant 2 (60 CP, duration 1 year 6 months) admission conditions have been supplemented. Previously, admission required a professional Bachelor's degree in information technology, computer systems, electronic commerce, electronic business, or compatible education. The requirements have been extended by stipulating that the students with a Bachelor's degree in natural sciences obtained in four-year studies or an education compatible thereto can also be enrolled in this program variant.
3) Variant 3 (80 CP, duration 2 years) admission conditions have been formulated anew – Bachelor's degree in information technology, computer management, computer science, computer systems, computer science, or compatible education.

Compulsory courses: 16 credits are the same for all the variants, and 10 additional credits are added to V1
Compulsory elective courses are the same, for V2 and V3 it is 10 credits, while for V1 it is 16 credits.

Master project credits: V1 - 26, V3, V3 - 20
Internship: V1, V3 - 26, V2 - 6

However, the difference between different variants is mostly in credit points, i.e. the courses are the same, but the students have a choice when to stop their studies, and still get some degree. It could be a reasonable choice for the IT study program, where it is pretty hard to retain students. However, only in the longer term, it will be seen how well it works.

2.1.4. As described in the Self-Assessment Report, and fully acknowledged in the evaluation for an international scale, “Information technology is one of the most significant and fastest growing sectors of the Latvian economy, which constantly needs young specialists”. As such, the need and justification for a study program that trains IT specialists are obvious.
The major employers for the graduates (and students) of the “Information Technology Project Management” program are Accenture, Tieto, Latvenergo, TET, Printful, Emergn, and Visma (i.e. both national and international firms/corporations). The unemployment rate among program graduates is very low (less than 2%), which is expected (although the presented data are rather old, from 2017/2018).
The master study program “Information technology Project Management” starts on average with 30 students in the first year (the average over the last 9 academic years, for all study duration variants). It should be also noted that in the last five years, the number of enrolled students dropped significantly by some 40%. The admission to the program seems stable in recent years between 24 and 23 per year for the 2.5-year variant but very few students for the 1.5-year variant. According to the SAR pp. 207, there are no students enrolled in the 2-year variant of the program. The question is how much overhead does keeping the 1.5-year variant if there is little interest in it.
The average number of graduates is 18, which represents 60% of the total admission. These numbers represent a high dropout of students, in both the first year of study and in the last year of study (failure to prepare/defend the dissertation). The reasons identified in the Self-Assessment Report are the student employment during the studies. The management of the program is thus aware of this situation and considers some corrective actions (schedule classes after 16.30 hours).

2.1.5. Not applicable
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Conclusions on this set of criteria, by specifying strengths and weaknesses

Conclusions
The program title is compliant with the study field. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable (with respect to the objectives of the university). The program is fully justified and aligned with the requirements of the labor market.

Strength:
1. The title of the program reflects the contents well.

Weakness:
1. Average graduation number is low and additional effort should be made to increase it (increase admission constraints, better tutoring/ mentoring of the students during their studies).
2. There is no timely update on the number of employed graduates, such that one cannot follow the employment rate 12 months after graduation.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. Professional master study program “Information Technology Project Management” is provided in three variants: Variant 1 (100 CP, duration 2.5 years); Variant 2 (60 CP, duration 1.5 years); Variant 3 (80 CP, duration 2 years). All three variants contain the same core courses, but Variant 3 contains a larger volume of an internship than Variant 2, and Variant 1 contains study courses covering the basics of the IT sector. 16 CP (Variant 2 and 3) or 24 CP (Variant 1) are allocated to the compulsory part, 18 CP (Variant 2 and 3) or 24 CP (Variant 1) are allocated to compulsory elective study courses, 6 CP (26 CP in Variant 1 and Variant 3) are allocated to internship and 20 CP (26 CP in Variant 1) are allocated to the Master Thesis. It is unclear why Variant 1 contains more CP allocated for the Master Thesis. According to the content, the core study courses are divided into three groups: Information Technology Project Management And System Analysis, a large variety of Compulsory elective study courses (B1), and compulsory elective study courses (B2) of Humanities and social sciences. Of all Compulsory elective study courses, some are related to the study field (For example, Data Governance Study Project, Project Risk Management) and provide additional knowledge and skills, but not necessarily in-depth knowledge and skills, while others are not directly related to the study field (for example, WEB Programming, Electronic Commerce, Large Databases, Logistics Information Systems) and are not necessarily interconnected and complementary. Compulsory elective study courses (B2) in Humanities and social sciences contain very general topics and are not customized for the study program or the learning outcomes. Most of them are only related to Learning outcome 1, which is very general in itself. Internships and also project-based learning study courses (both in A and B1) are valuable and relevant to achieve the necessary knowledge and skills to meet the needs of the industry and labor market. As a master's program, this study program doesn’t provide any study courses which explicitly teach research and scientific knowledge and skills. Self-evaluation report provides a mapping of the requirements for compliance of the study program with all relevant national regulations.
Overall, compulsory study courses correspond to the objectives of the program and ensure the achievement of learning outcomes. Compulsory elective study courses only partially correspond to the objectives of the program and ensure the achievement of learning outcomes. Project-based learning courses and internships are relevant to the objectives of the study program. This program doesn't have a C (free elective part).

2.2.2. The final requirement for obtaining the degree is the writing and defending of a Master’s thesis. The degree is awarded based on the results of a reviewed theoretical and/or practical research (Master Thesis) public defense and the examinations within the study courses.
The awarding of a degree is partially based on the achievements and findings of the relevant field of science. A large set of the master's thesis is related to the Information Technology field of science, but not specifically to Information Technology Project Management. Collaboration with academic institutions exists but is limited to a few cases and is mostly national and RTU scientific institutions. Publications within part of master thesis work exist but most are published in national-level or C-or-below-level international conferences. Collaborations with industry exist, but are limited to a few cases and are mostly related to the more general Information Technology field of science.

2.2.3. Various methods are used to achieve the aims of the study program and there is good involvement of practitioners of the field in teaching. Different study methods used in the implementation of the study program are used and are relevant to the learning outcomes of the study program, including methods of student-centered learning. Project-based learning and practical work methods are used and in some courses students research and solve real practical tasks and problems. However, considering the field of studies and industry needs, project-based learning

should be used better. E.g. while a couple of mentioned courses do have some elements of project-based learning, courses and/or projects are short-term or project-based activities in courses do have a small workload compared to the total workload of all study activities in the given semester. That doesn't help students to experience in-depth inquiry of topic or communication, coordination, and group dynamics of prolonged working together.
Furthermore, of the courses mentioned - still, most of them, the main method of assessment is exam, not group-work or project-based learning.
Student-centered learning methods, such as experimental or empiric learning, gamification, flipped class, and practical and laboratory work are used in some courses. However, student-centered learning methods may be introduced in even more courses to make learning as practical and applicable to the industry as possible.

2.2.4. The internship is organized during the final year of studies. Its volume depends on students' previous education. 6CP project management practice (study course DOP713 Project Management Internship) is obtained in the last semester of studies (all Variants). Additional 20 CP is intended for the basic practice (study course DOP733 Internship) for students with non-information technology related (Variant 1) or Bachelor's degree in information technology, who require to undertake a larger volume of an internship than students enrolled in Variant 2 (Variants 3).
The internship tasks are formulated per the requirements of the undertaking and the study program and are monitored by the internship manager at the undertaking. Internship committees have been set up for the evaluation of internship reports. During the internship, regular consultations with the internship manager at the undertaking and the internship coordinator at the university are scheduled. However, acquire all six the practical skills necessary to fulfill the qualification requirements during 6 CP internship: 1) development of the concept of the IT solution and the description of the project coverage; 2) justification of the choice of the project process; 3) development of the project plan; 4) project quality management; 4) project personnel management; 5) ensuring communication within the project; 6) control of the progress of the project; 6) project risk management seems questionable and unrealistic.
A meeting with students is organized at the end of the first year of studies where a survey is conducted to identify internship placement needs. Internship at the already existing workplaces of students is also supported; this is possible in cases when the work tasks of the student at the existing workplace comply with the internship requirements. If students indicate a need for help, RTU Career Center is involved and companies providing suitable internship opportunities are recommended. Since 2015, the students have had access to a webpage where companies are invited to place vacancies that are relevant for RTU students.

2.2.5. Not applicable

2.2.6. During the reporting period (from 2013/2014 to 2020/2021), 136 Master's students defended their Master's thesis. Students study problems encountered by the students during their internships in the industry or observed in their previous professional activities. The topics of the Master Theses can be divided into the following groups: Use of Agile methods in software development processes and projects; Use of software development technologies and frameworks; Improvement of the operation of enterprise applications and business analytics solutions; IT governance; Comparison, selection, and adaptation of IT project management methodologies and tools; Use of innovative technologies to solve problems important to business and society; Cybersecurity and information protection. While most of the topics of the Master Theses reflect the scientific novelties relevant in the field and the labor market, some topics with questionable relevance in the field, topics as the Use of innovative technologies to solve problems important to business and society; Cybersecurity, and information protection. These two topics in this study program are especially questionable

because they are covered in other RTU study programs.

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

Conclusions
Overall, compulsory study courses correspond to the objectives of the program and ensure the achievement of learning outcomes. Compulsory elective study courses only partially correspond to the objectives of the program and ensure the achievement of learning outcomes. Project-based learning courses and internships are relevant to the objectives of the study program. Various methods are used to achieve the aims of the study program, including project-based learning and practical work methods are used, but considering the field of the studies and industry needs, probably should be used even more. Most of the topics of defended Master Theses are relevant to the field and have been in part with industry trends. However, some topics are with questionable relevance in the field, topics as the Use of innovative technologies to solve problems important to business and society; Cybersecurity, and information protection and would fit better in the academic master study program ''Information Technology'' or other RTU master study programs of the study field.

Strengths:
1. Extensive opportunities and provision of internships offered to students.
2. The core study courses (compulsory and some compulsory electives) are relevant and meet the needs of the industry, labor market, and scientific trends.
3. Project-based learning courses and internships.
4. Different study methods used in the implementation of the study program are used.

Weaknesses:
1. Many unrelated, non-interconnected, or complementary study courses in compulsory elective study courses.
2. DOP713 Project Management Internship (6KP) for all students 6CP is relatively short, while stated achievable tasks and acquirable skills are extensive.
3. Not all topics of the master thesis and themes of the master thesis are related to the field; a large set of the master theses are related to the Information Technology field of science, but not specifically to Information Technology Project Management.
4. This program doesn't have a C (free elective part).

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: Partially compliant

As shown in criteria 2.2.2 and 2.2.6, the study program does not focus fully on its declared aim but remains at a more general Information Technology level.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. According to the SAR, the study process is ensured by the academic and technical staff of FCSIT, including the following units of FCSIT and RTU: 1) FCSIT Institute of Information Technology; 2)FCSIT Institute of Applied Computer Systems; 3) FCSIT Institute of Intelligent Computer

Technologies; 4) RTU Institute of Technical Physics; 5) RTU Faculty of E-learning Technologies and Humanities. RTU institutes and their departments ensure the training and methodological work: develop and update the curriculum, provide delivery of corresponding study courses, supervision and examination of final theses and carry out other activities related to teaching, methodological and research work.

Methodological and informative provision is based on the services provided by the RTU Scientific Library (SL). RTU Scientific Library is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure the RTU study process and research activities, as well as provides a library, bibliographic, and information services to RTU students, academic and general staff. The Library stocks more than 1.29 million printed documents and e-resources in RTU industry specific databases.
During the expert visit, it was identified that the library has an accessibility-based policy. The library is accessible to students 24/7. The extensive database is accessible remotely to the university staff and students through the ORTUS portal. The visit found no evidence that the library is not able to provide information support for the study program.
According to SAR, RTU provides funding for information resources for each study program according to certain financial calculations. The collection is replenished according to the recommendations of the heads of the study program, and researchers, in compliance with the allocated funding. Meetings with both teaching staff and students did not reveal any evidence of problems in the renewal of the library's information resources.
The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs. During the experts' visit, it was identified that the Moodle platform is widely used and accepted among the teaching staff and students.
The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable.

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report.
As presented in SAR pp. 232 the approximative budget is 250k euros on average per year. As presented in SAR pp. 207 there approximative 31 students/year (for all study years, all study forms). The average budget is 8k euros/student/year, which is well above the calculated cost (SAR pp. 232) of 3.6k euros/student/year. The number of the students in the study program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculty and university, with good provisions, and popular among students.

Current funding is sufficient and the program seems profitable.

Strengths:
1. High-quality facilities for implementing the study process, ergonomic and well-equipped laboratories, a well-maintained and easily accessible library.
2. High-quality and responsive IT support.

Weaknesses:
No weaknesses were identified.

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 program is compliant with all requirements.

2.4. Teaching Staff

Analysis

2.4.1. In the SAR it was confirmed that the qualification of the academic staff involved in the implementation of the study program fully complies with the conditions for the implementation of the study program and the requirements of regulatory enactments.
All the academic staff responsible for the study courses hold a Ph.D. in the corresponding field and 17 Ph.D. degree holders participate in the implementation of the study program and some of them also have prior experience in the industry. In the implementation of the study program, guest lecturers from the industry with a Master's degree and at least 7 years of experience as well as Ph.D. students also participated which is positive.
The academic staff participates in national and international research projects and publishes relevant research journals related to engineering, mathematics, project management, and social sciences. Interdisciplinary and multidisciplinary staff composition can significantly contribute to the achievement of students in this interdisciplinary study program.
Some members of the academic staff participated in Erasmus mobility and teaching competencies development but there is no evidence of a systematic institutional plan for comprehensive teaching competence development (not just the use of technology in teaching).

2.4.2. According to SAR 3.4.2. renewal of the staff has been considered a priority task and the number of academic staff over the past five years was stable. The average age of the academic staff has decreased slightly over the last five years and several promotions of the younger professors have been done.

2.4.3. Not applicable.

2.4.4. As presented in the Self-Assessment Report pp. 94, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”.
The discussion with the management of RTU (mainly the Vice-Rector in charge of research)

emphasized that RTU has
developed key performance indicators based on the research (such as the number of citations of the publications)
and the achievement of KPIs is part of the dean's management contracts. Academic staff is evaluated based [almost]
on the same criteria. As such, as mentioned in the Self-Assessment Report of the program (pp. 233-242),
from the last evaluation in 2013, the teaching staff contributed to peer-reviewed journal papers and a good number of conference papers. The RTU shows an overall impressive list of publications (Annex 2.4.4_Projekti(Pētījumi)Jaunrade_LV_Projects(Research)Creation_ENG.zip and 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip) in which the search for achievements related to a specific study program are very hard to identify.

2.4.5. The cooperation between academic staff is promoted (SAR, 3.4.5) including regular conferences and professional development seminars. The range of measures is used, according to SAR 3.4.5., for the exchange of good practices related to academic activities, starting from the meetings of the organizational units, followed by annual conferences and seminars. Besides that, e-platforms are available to teaching staff to share experiences, for example, e-learning open courses with examples of best practices in the development of e-learning courses and joint study courses; e-conference platforms.
In SAR 3.4.5. it is pointed out that improvement of the study courses is carried out on a regular basis, based both on the suggestions expressed by students and on the development trends of the sector.
The program's academic staff also participates in several international projects, where the possibilities of improvement of study programs and study courses in a particular field have been offered.
The study program has a favorable student-teacher ratio (4:1).

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

Conclusions
The qualification of the academic staff involved in the implementation of the study program complies with the conditions for the implementation of the study program and the regulatory requirements. The teaching staff composition is interdisciplinary with a convincing research track record in corresponding fields. The staff, and consequently students, will benefit from a systematic institutional plan of comprehensive teaching competence development and higher participation in international mobility (e.g. Erasmus +). Renewal of the academic staff has been considered during the reporting period as a priority task. The distribution of academic staff is appropriate for the needs of the study program. Opportunities for mutual cooperation and exchange of practices among academic staff have been organized on a regular basis.

Strengths:
1. The teaching staff is interdisciplinary which corresponds to the aim of the study program.
2. The teaching staff composition is interdisciplinary with a convincing research track record in corresponding fields.
3. Regular conferences and professional development seminars are in place.
4. E-platforms are available to teaching staff to share experiences, for example, e-learning open courses.
5. Favorable student-teacher ratio.

Weaknesses:
1. A systematic institutional plan for comprehensive teaching competence development and higher participation in international mobility is missing (because many opportunities are available).

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

All criteria are satisfied. No major shortcomings have been identified. A minor shortcoming is related to the lack of a systematic institutional plan for teaching competencies development.

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

P06_3.2.1_DGI0(47483)_AtbilstibaValstsStandartam_ProfMag_EN.pdf with confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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 P07_3.2.1_DGI0(47483)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf confirms that the program is partially compliant with the standard of profession of the standard for the occupation of Information Technology Project Manager (the standard has been submitted (March 2022) but not not yet approved).
In addition, the professional standard approved on March 30 , 2003 is currently in force and is available on the VISC website:
https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0170.pdf
In case the specified professional standard will not be adopted until the decision on the accreditation of the study field will be made, RTU must ensure that the study program meets the current professional standard.

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 (A10_DGI0(47483)_StudyCoursesdescr_ENG.zip) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (47483_ProfesProgr_Diploms DiplomaPielikums ENG.zip)complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached are resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU professional master study program “Computer Systems”

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 professional standard of Project Manager in Information Technology is submitted (March 2022) but not yet approved. In case the standard is not approved before accreditation, a comparison should be made with the current professional standard.

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

The program title is compliant with the study field. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements. The changes to the parameters of the study program are justified and reasonable (with respect to the objectives of the university). The program is fully justified and aligned with the requirements of the labor market. Overall, compulsory study courses correspond to the objectives of the program and ensure the achievement of learning outcomes. Compulsory elective study courses only partially correspond to the objectives of the program and ensure the achievement of learning outcomes. Project-based

learning courses and internships are relevant to the objectives of the study program. Various methods are used to achieve the aims of the study program, including project-based learning and practical work methods are used, but considering the field of the studies and industry needs, probably should be used even more. Most of the topics of defended Master Theses are relevant to the field and have been in part with industry trends. However, some topics are with questionable relevance in the field, topics as the Use of innovative technologies to solve problems important to business and society; Cybersecurity, and information protection and would fit better in the academic master study program ‘’Information Technology’’ or other RTU master study programs of the study field. High-quality facilities for implementing the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library. The qualification of the academic staff involved in the implementation of the study program complies with the conditions for the implementation of the study program and the regulatory requirements. The teaching staff composition is interdisciplinary with a convincing research track record in corresponding fields.

Strengths:
1. Extensive opportunities and provision of internships offered to students.
2. The core study courses (compulsory and some compulsory electives) are relevant and meet the needs of the industry, labor market, and scientific trends.

Weaknesses:
1. Average graduation number is low and additional effort should be made to increase it (increase admission constraints, better tutoring/ mentoring of the students during their studies).
2. Consider the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
3. Not all topics of the master thesis and themes of the master thesis are related to the field; a large set of the master thesis is related to the Information Technology field of science, but not specifically to Information Technology Project Management.

Evaluation of the study programme "Information Technology Project management"

Evaluation of the study programme:

Average

2.6. Recommendations for the Study Programme "Information Technology Project management"

Short-term recommendations

1. In many cases, individual study course outcomes do not correspond well to study programs’ learning outcomes. Consider a change in mapping: instead of mapping study program learning outcomes to study course (and learning outcomes), map study courses to study program outcomes. Also, consider applying Bloom’s Taxonomy or a similar framework when assessing how individual study outcomes contribute to and fulfill study program learning outcomes.
2. Increase the number of project-based courses, and group-learning-based courses where it is possible to attain soft skills through learning by doing. Consider more module-based courses, merging similarly themed courses to make room for more project-based and group-learning-based approaches and limit the number of courses that students have to learn in parallel.
3. Increase the number of courses where project themes or topics are provided by the industry.

4. Add more opportunities to learn about research, and research methodology and provide more opportunities for students to participate in research activities.
5. Consider collaborating with the industry to figure out how to increase the prestige and meaningfulness of the Master's Degree in IT.
6. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
8. Consider implementing a consistent plan for the reduction of the student drop-out rate.
9. Develop a systematic institutional plan of comprehensive teaching competence development and support for participation in international mobility.
7. Consider revising achievable tasks and what new skills can be acquired during the internship. Also, when revising achievable tasks it should be taken into account that this is the master study programme and most of the students are already working.
10. In case if the project of professional standard is not approved until the decision on the accreditation of the study field is made, it is necessary to make a comparison with the professional standard which is in force
11. Consider adding to the study program an elective part (C) (in accordance with the Law on Higher Education Institutions, Section 55, Part One, Clause 2 c)
12. Project-based learning and practical work methods are used, but considering the field of the studies and industry needs, probably should be used even more.

Long-term recommendations

1. Consider creating student portfolios as part of their potential CV. For example, support and request creating git repositories with all student coding and project activities.
2. Consider creating a system, where systematic issues with study programs and study courses can be followed up and raised in severity and importance if they persist through the years.

II - "Transport Electronics and Telematics" ASSESSMENT

II - "Transport Electronics and Telematics" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Professional master study program “Transport Electronics and Telematics” is included in the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. The study program by its parameters, indicators, and content fully complies with the chosen study field.

2.1.2. The study program “Transport Electronics and Telematics'' is a professional master study program with the goal to prepare specialists in the fields with the qualification “Leading electronics engineer”. The qualification corresponds to level 7 of the Latvian qualifications framework (LKI) and level 5 in the professional qualification framework (PKL). The degree to be obtained is a Professional master's degree in transport electronics and telematics. The classification code (IKK) is 47523.

Following this code 523 corresponds to the “Electronics and automatics” subsection under the thematic field of “Engineering sciences and technologies” and 47 corresponds to professional master higher education. The length and study mode is full time 2 years 80 CP or full time 1 year 6 months 60 CP and the structure of studies is in accordance with relevant standards of education - Cabinet Regulation No. 512 ‘Regulations on the second level of professional higher education state standards’. Graduates are to receive qualification at the end of studies. During the reporting period, only the Latvian language study mode is being implemented, but English version of the program are proposed in this accreditation. Documents are submitted only for full-time studies, while at the same time on the webpage (https://www.rtu.lv/lv/studijas/visas-studiju-programmas/atvert/EGT?department=13000&type=A), it is noted, that part-time extramural studies are also available. Admission requirements for the 1-year 6-month program is a professional degree in transport electronics and telematics and/or 5th-level professional qualification or other relevant education. Requirements for the 2-year program is an engineering science bachelor's degree in electrical engineering.
The study program goal is SAR pp. 330 “to train professionals of internationally recognized level with a professional master’s degree trained to perform design and technical operation works for transport electronics and telematics systems in the following fields: transport radio systems, transport telecommunications, transport computer systems and networks, aviation communication systems, railway transport communication and information systems. To teach professionals skills of analytical thinking, modelling, developing, implementing, and managing new engineering solutions. In addition, to develop ability of the students conduct a research and experimental work, participate in local and international projects, and continue their doctoral studies.”
The study results are as follows SAR pp. 330-331:
“Graduate of the study programme (planned achievable results):
- can manage transport computer networks, understand their internal processes;
- can design, develop, and operate electronic equipment and telematics systems. Perform its testing, analysis, operation modelling and improvements in accordance with requirements of the standards and develop the appropriate technical documentation;
- can utilize latest technologies and software for design and production processes of electronic equipment and systems;
- can participate in research projects and provide assistance in pedagogical work;
- can evaluate human resources and create a project working group, delegate work tasks and control their execution, present the progress and results of the project;
- is proficient at the concept level in latest telematics and electronic equipment manufacturing technologies, industry standards and technical norms;
- is proficient at the application level in signal processing, telecommunications theory, data coding and protection (cryptography) and training neural networks;
- is proficient at the application level in construction and design of telematics equipment, transport intelligent data transmission systems and sensor networks;
- is proficient at the application level in programming microcontrollers and microprocessors by using high-level languages.”
The study program both by its title, degree, qualification, and curriculum is consistent with the study field "Information technologies, computer engineering, electronics, telecommunications, computer management, and computer science". The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program; still the content of the program (as presented in Section 2.2) shows little support of the TRANSPORT electronics and the title seems overstated with respect the content.

2.1.3. During the reporting period some significant changes were made to the study program. As noted by RTU in SAR 3.1.1 the part-time and extramural implementation forms of studies were

excluded. Since 2017, all students of the part-time study program were transferred to a full-time study program, and admission to the part-time study program was discontinued, yet, as noted previously, the webpage has not been updated and old information remains regarding the part-time study program. There are other changes planned to implement, e.g. changing admission requirements for the 1-st implementation (60 CP) from “professional bachelor degree in transport electronics and telematics and/or the 5th level Professional Qualification or comparable education” to “professional bachelor degree in transport electronics and telematics and electronics engineer qualification or equivalent education”;
to change admission requirements for the 2-nd implementation (80 CP) from “bachelor degree of engineering science in electrical science” to “bachelor degree of engineering science in electronics, telecommunications or equivalent education”;
to change the degree and qualification assigned for the 1-st implementation (60 CP) from “master degree in transport electronics and telematics” to “professional master degree in transport electronics and telematics and qualification of leading electronics engineer”;
to change the degree and qualification assigned for the 2nd implementation (80 CP) from “professional master degree in transport electronics and telematics and qualification of electronics engineer” to “professional master degree in transport electronics and telematics and qualification of leading electronics engineer”. Implemented and planned changes to the parameters of the study program are justified and supported.

2.1.4. As of now there are 19 students in total studying in the program. On average about 7-11 students enrolled in the study program each year. Yet the number of graduating students is at low levels - 2020./ 2021. only 2 students graduated, in 2019./ 2020. - 1 student graduated, in 2018./ 2019. - 0 students graduated. Regarding employment indicators of the graduates of the study program - it must be highlighted that although general trends within the industry indicate good opportunities for employment, RTU failed to produce meaningful and actionable statistics regarding the employment of students graduating from this study program, therefore it is impossible to analyze these criteria.

2.1.5. Not applicable

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

Conclusions
The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field. However, it must be noted that RTU does not have data regarding the employment of graduates from this study program. RTU’s webpage still features old information regarding the option to enroll in part-time studies, an option still legal, but obviously abandoned for the current accreditation.

Strengths:
1. Study program fulfills a valuable economic role in providing the industry with specialists within the field.

Weaknesses:
1. Information on the webpage regarding study parameters is not up to date.
2. RTU does not collect relevant information regarding graduate employment.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The type of implementation is full-time studies (1,5 or 2 years). In the standard planning of RTU in each study year, there are 2 semesters, the length of each semester is 20 weeks - 16 study weeks and 4 session weeks.
The volume of the study program is 60 CP (90 ECTS) or 80 CP (120 ECTS). The study program can be enrolled by applicants with academic or professional bachelor's degrees in engineering or equivalent education.
The volume of compulsory study program courses is 23 CP (34,5 ECTS). The compulsory study courses develop the knowledge and skills of the students and promote knowledge and skills in scientific research methods and their application.
The compulsory elective (specialized) study courses (11 CP or 16,5 ECTS) are intended to enable future professionals to obtain in-depth knowledge in their selected specialization field.

The content of the master study program "Transport Electronics and Telematics" generally complies with the standard of profession of the "Leading electronics engineer". Therefore, both formally and in fact, the content of the study program is topical and corresponds to specific industry needs.
However, during the meeting with employers, several drawbacks regarding the content were identified. Employers pointed to the need to improve the teamwork and presentation skills of graduates. Such skills are required by applied professional standards as well.
In addition, it is worth mentioning that when reviewing the content of the study program, one gets the impression that only a minority of the courses are devoted to transport electronics.
There is only one study course clearly and directly related to transport electronics within compulsory study courses - "Methods of Transport Real-Time System Performance Evaluation" (TRL446, 6 ECTS). Although the title "Digital Signal Processing in Transport Telecommunications Systems" (TRT306, 4.5 ECTS) implies that the study course is devoted to transport telecommunication systems, the course content and used literature sources indicates that this is a general-purpose digital signal processing course without the context of transport systems. As a result, it can be concluded that in the compulsory courses section, studies directly related to transport electronics contribute only 6 ECTS out of 34.5 ECTS. There is not even one study course clearly and directly related to transport electronics within field-specific study courses. There is a strong list of study courses relevant to transport electronics as for other subdisciplines of electronics, but the context of transport electronics is missing.

2.2.2. According to SAR and interviews, the final requirement for the Master's degree is the defense of an individually designed Master's thesis. The Master's thesis defense demonstrates the student's ability to analyze and apply ideas described in the professional and scientific literature in the field of electronic engineering, as well as to independently develop a project in the field of technology. According to SAR, the master's thesis must be publicly defended in front of a State Examination Commission. The commission operates in accordance with regulations approved by the University Senate and consists of both university academic staff and industry professionals.

2.2.3. There is a certain list of classical teaching methods well established and used on a daily basis to achieve the aims and learning outcomes of the study program: lectures or practical classes, group work, or independent work (both at home or in the facilities of RTU). The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.
The experts' visit found that student-centered methods are sometimes used, but unfortunately, most of the teaching staff did not give the impression that they would use such methods in their teaching practice. On the contrary, during the discussion, the impression was that many of the teachers were hearing about such methods for the first time. Moreover, no evidence of the use of

such methods was available in the self-assessment report.
On the positive side, a learning-by-doing approach is actively used and supported during studies.

2.2.4. According to the curriculum plan, depending on the program version (60 CP or 80 CP) the following study courses are provided: TRT013 Internship or TRT010 Internship. For students who have previously completed the professional Bachelor study program, it is only necessary to attend the TRT013.
The Internship is organized in compliance with the Senate decision on the Procedure of the organization of the Internship at RTU (Approved at the Meeting of RTU Senate on 28 January 2019 (Minutes No 626). The procedure of organization of the Internship at RTU stipulates the procedure for organizing and managing internships at Riga Technical University. The description of the procedure is a high-level document covering all professional study programs of RTU.
During meetings with employers, the experts were convinced that the students and the teaching staff of the study program have very close and regular connections with the industry. As a result, no factors were identified in both SAR or the expert's visit that could create obstacles to finding and achieving a successful internship.
The study program is also implemented in the English language. According to SAR, the provision of internships for foreign students is organized in the same way as for local students. Additional support is provided for the Department of International Cooperation and Foreign Students, which participates in negotiations with students and potential internship providers by explaining formal requirements as necessary.
However, neither SAR nor the results of the expert's visit provide any evidence of the provision of internship in English.

2.2.5. Not applicable

2.2.6. The SAR contains a list of all the topics of the master theses during the evaluation period. They are all related to the field of study and the content of the program. Although, it should be noted that a minority of all topics are devoted to transport electronics.

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

Conclusions

Strengths:
1. A learning-by-doing approach is actively used and supported during studies.

Weaknesses:
1. The title of the study program is completely misleading because there is only one study course with a strong context of transport electronics.
2. Student-centered teaching methods are used in the study process, however, the teaching staff is not sufficiently familiar with them at all, except for steam work and independent work.
3. The provision of internships for foreign students is organized in the same way as for local students, with limited support for the provision of internships in a foreign language.

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

No major shortcomings have been identified.
Some weaknesses are identified.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the master study program “Transport Electronics and Telematics”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
In addition to the basic study laboratories, students can also use the specialized laboratories located on the Faculty of Electronics and Telecommunications premises: the Laboratory of Transport's Network Performance Evaluation and Radio Navigation, the Laboratory of Transport Electronics, the Photonics laboratory, the simulator classroom for communication systems and telecommunication networks, the Laboratory of the Internet of Things (IoT). It should be noted that the program involves the use of a special software and hardware infrastructure, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware and software platforms.
The courses of the master study program are provided mainly by the teaching staff of the Faculty of Electronics and Telecommunications (Electronic Hardware Academic Department, The Academic Department of Fundamentals of Electronics).
According to the SAR pp. 350-351, the master study program “Transport Electronics and Telematics” has an equivalent allocation of some 10 state-funded seats per year, with an own budget of some 64k euros/year. This seems to be sufficient for sustaining the number of enrolled students, but not sufficient for the resilient development of the program.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the master study program “Transport Electronics and Telematics” has an equivalent allocation of some 10 state-funded seats per year, with an own budget of some 64k euros/year (there are no tax-paying students) according to SAR pp. 350-351. Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program:

literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability. The current program has on average some 8 students enrolled in the first year (on average over the last 8 years, according to Annex P05_3.1.4_EGT0(47523)_StatistikaparStud_LV_StatisticsonStudents_ENG). This small number of students is clearly non-profitable for the university.

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) such that the bachelor program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development. It should be noted that the program involves the use of a special software and hardware infrastructure, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware and software platforms.

Strengths:
1. Very good access to scientific databases and e-learning technologies.

Weaknesses:
1. The number of admitted students is low and in 2017 – 2020 was not profitable, however in 2020/2021 number of students have increased to 15 budget-funded seats, and the program is on its way to becoming financially stable.
2. The planning of the hardware replacement/ upgrade is apparently not performed and included in the financial planning.

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 provisions are sufficiently met to insure the achievement of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report pp. 352-354 and in the Annexes to SAR submitted for evaluation, the teaching staff of the master study program “Transport Electronics and Telematics” consists of 11 persons, out of which 4 Professor, 2 Assoc. Professors, 4 docents, and 1 senior researcher; 6 persons hold a doctoral degree (in Physics or Engineering). The study program is implemented for less than 250 students. The teaching staff provisions are evaluated to conform to

the requirements of the Higher Education Law of Latvia. Considering the plan to implement program in English, the SAR does not mentions anything particular regarding the English language skills of the teaching staff; only at pp. 332 it mentions "The analysis on implementation in English language hasn't been made, since there were no students in English groups during the review period. Still, several study courses of the study programme are implemented in other RTU study programmes in English."; there are no signals (from student surveys or other) to contradict the assumption that English language skills of the teaching staff exist.

2.4.2. As indirectly presented in the Self-Assessment Report (the names of the teaching staff of the program at the previous evaluation are not mentioned), the teaching staff of the master program “Transport Electronics and Telematics” has been changed significantly with respect to the previous evaluation (the average age of all teaching staff categories decreased - the average age on all teaching staff was 56 years in 2012, and now is 46 years), as presented in SAR pp 355. As observed in 2.4.1, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). The SAR pp. 355 mentions “The policy of recruitment, renewal and professional development of the academic staff is based on the regular involvement of master’s study program students, master’s degree graduates and doctoral students in the process of studies.”, but there are no references, annexes or other analyses to support that claim. All this shows that the teaching staff composition change was managed successfully by the responsible structure; still, there is no available documentation regarding any specific provision on staff change at the University/ Faculty level.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (pages 356-357) does not mention specific information about publications of all the teaching staff involved in the program (although these publications exist, as explained in the presentation of the key teaching personnel, presented on pages 352-355). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU (email, chat, and video conference platforms, cloud collaboration, e-learning platforms), access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions

and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 11 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) towards the successful implementation of the study program.

Strengths:
1. The teaching staff has strong academic expertise.

Weaknesses:
1. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
2. There are no documented provisions regarding the management of the changes in teaching staff.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06
(P06_3.2.1_EGT0(47523)_CompliancewiththeStateEducationStandard_ProfMag_ENG.pdf)
confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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: Fully compliant

Annex P07 (P07_3.2.1_EGT0(47523)_ComplProfStand_ENG.pdf) confirms that the program is compliant with the Leading Electronics Engineer professional standard, as found on https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-143.pdf

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 (A10_EGT0(47523)_StudyCoursesdescr_ENG.zip) are prepared in latvian and english. Descriptions comply with regulations set forth in 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 sample (P28_3.1.2_EGT0(47523)_DiplPielik_LV_DiplSupplemt_ENG.zip) complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - valsts valodas zināšanas.edoc”) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - svešvalodu prasme.edoc”) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU professional master study program “Smart Electronic Systems”.

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

RTU confirmation (Apliecinājums - par zaudējumu kompensāciju.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program fully complies with regulatory enactments.

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

The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field. Still, in the content of the program, only a minority of the courses are devoted to transport electronics. There is only one study course clearly and directly related to transport electronics within compulsory study courses - “Methods of Transport Real-Time System Performance Evaluation” (TRL446, 6 ECTS). Although the title “Digital Signal Processing in Transport Telecommunications Systems” (TRT306, 4.5 ECTS) implies that the study course is devoted to transport telecommunication systems, the course content and used literature sources indicates that this is a general-purpose digital signal processing course without the context of transport systems. As a result, it can be concluded that in the compulsory courses section, studies directly related to transport electronics contribute only by 17% of the curricula.

The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the bachelor program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

Strengths
1. A learning-by-doing approach is actively used and supported during studies.

Weaknesses
1. The title of the study program is completely misleading because there is only one study course with a strong context of transport electronics.
2. Student-centered teaching methods are not used sufficiently to implement the study process, and most of the teaching staff are not familiar with them at all.
3. RTU does not have data regarding the employment of graduates from this study program.
4. Soft skills are mentioned as missing by employers.

Evaluation of the study programme "Transport Electronics and Telematics"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Transport Electronics and Telematics"

Short-term recommendations

1. Revise and update the content of the study program and significantly increase the number of study courses that are strongly related to transport electronics, to eliminate the existing situation, when the title of the study program does not comply with the content.
2. Revise and update the content of the study course “Digital Signal Processing in Transport Telecommunications Systems” (TRT306), in order to introduce context and examples related to transport telecommunications.
3. Consider the realization of the timely update on the number of employed graduates, such that one can follow the employment rate 12 months after graduation.
4. Update the program’s website.

5. Extended support for foreign students by providing more information and communication possibilities in English, e.g. by providing internship information and possibilities in English.

Long-term recommendations

1. Consider the documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
2. Consider the implementation of a mentoring/ tutoring mechanism for all the students based on the implication of the teaching staff.
3. Consider the planning of the hardware/software replacement/ upgrade and include the cost estimates in some financial planning.
4. Consider implementing a consistent plan for the reduction of the student drop-out rate and the increase of the number of enrolled students.
5. Introduce more student-centered teaching methods into the study process.
6. Introduce methods that could improve the soft skills of the students.

II - "Smart Electronic Systems" ASSESSMENT

II - "Smart Electronic Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Professional master study program “Smart Electronic Systems” is included in the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. The study program by its parameters, indicators, and content fully complies with the chosen study field.

2.1.2. The study program “Smart Electronic Systems '' is a professional master study program with the goal to prepare specialists in the fields with the qualification “Leading electronics Engineer”. The qualification corresponds to level 7 of the Latvian qualifications framework (LKI) and level 5 in the professional qualification framework (PKL). The degree to be obtained is a Professional master's degree in electronics. The classification code (IKK) is 47523. Following this code 484 corresponds to the “Electronics and automatics” subsection under the thematic field of “Engineering sciences and technologies” and 47 corresponds to professional master higher education. The length and study mode is full-time 2 years (80 CP) and full-time 1 year 6 months (60 CP). The duration of studies depends on previous education. During the reporting period studies are conducted in Latvian and English. Admission requirements for 1 year 6 months 60 CP program are the professional Bachelor's degree in electrical science and the professional qualification of an electronics engineer or similar education. For 2 years 80 CP - the Bachelor's degree in engineering in the field of electronics of automation or similar education. Accordingly, the duration of studies is 1.5 years in the version of 60 CP and 2 years in the version of 80 CP because students have additional Internships amounting to 20 CP. The other study courses and types of examinations are the same in both versions. For international students, requirements are a bachelor's degree in engineering science in electrical Science, a video interview, and a certificate for English language skills (e.g. IELTS minimum overall grade of 5.5 or similar).

The study program goal is “To prepare specialists who understand the development trends of the industry in the world and are able to work in the field of research, development, installation, operation, and modernization of smart electronic equipment and systems.” The study results are as follows:
“Graduate of the professional master's study program "Smart Electronic Systems":
• is able to develop circuit diagrams of electronic equipment and systems, make prototypes, perform their testing, analysis, and improvement, observing the binding, industry-specific requirements of regulatory enactments and standards applicable to systems, processes, and products;
• is able to determine production technological processes, and manage the production of electronic equipment and systems in accordance with technical documentation, standards, and quality management system;
• is able to conduct research with scientific value in the field of smart electronic systems, professionally systematize information, summarize, interpret and analyze research results, and prepare summary reports and publications;
• is able to apply current technologies and software in the design and production process of electronic equipment and systems;
• is able to design electronic equipment and systems, perform their operation modeling, management software development;
• is able to develop printed circuit boards, and develop the corresponding technical documentation;
• is able to evaluate human resources and create a project working group, delegate work tasks and control their execution, and present the progress and results of the project;
• knows at the level of understanding: of current electronic equipment production technologies, electronics industry standards, and technical norms;
• knows electrodynamics, electromagnetic compatibility, and antenna theory at the application level;
• is familiar with analog and digital circuitry at the application level;
• knows at the application level the theory of signal processing, the construction, and design of transmission and reception equipment, as well as data transmission networks, sensors, and actuators;
• knows the programming of microcontrollers, signal processors, and programmable logic circuits in a high-level language at the application level.”
The study program both by its title, degree, qualification, and curriculum is consistent with the study field "Information technologies, computer engineering, electronics, telecommunications, computer management, and computer science". The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program.

2.1.3. Study program underwent significant reforms and had procedures for changes in 2021 and 2018. The title and the code of the program have been changed. The duration of the studies, particularly the amount of CP, has been changed. Two versions of implementation of the program have been introduced: 1.5 years– 60 CP if the professional Bachelor's degree in Electrical Engineering and the professional qualification of the electronics engineer or similar education has been completed before, and 2 years – 80 CP, if the Bachelor degree in engineering in the field of electronics of automation or similar education has been completed before. The degree to be conferred before – was the professional Master's degree in electronics and the qualification of the electronics engineer, the degree to be conferred now - is the professional Master's degree in electronics and the qualification of the Leading electronics engineer, in compliance with the introduced standard of the leading electronics engineer. And other changes regarding study course content. All changes are justified and supported.

2.1.4. The SAR pp. 504 states that "The professional Master study program "Smart electronic systems" has been developed in response to the industry development trends the requirements defined by employers and the Smart Specialisation Strategy set in Latvia." This is explained in SAR pp. 503 by: "The electronics industry is undergoing rapid development. Thanks to the continuous emergence and introduction of new technologies, substantial transformations occur every year in the industry. According to the recent forecast, there will be substantial development in the electronics industry during the next 7 years, and the common market will grow by 50-60%. Also, during COVID-19 pandemic, the development of the ICT sector increased, thus creating additional development opportunities (for example, the increase of the Chinese market of semiconductor production amounts to 30.6%). By following the recent trends and forecasts, also Latvia is developing relevant development strategies and concepts by providing the possibility to focus on resolving issues important for the national economy:
Sustainable development strategy of Latvia until 2030; Smart specialisation strategy; Guidelines of development of science, technologies and innovations 2021-2027."

As of now there are 82 students in total studying in the program. There are also 24 foreign students. Last year 31 students were enrolled, the year before - 28 were. The overall dynamics of the student body are good. RTU reports in SAR 3.1.3. that employment of the graduates of the study program is provided by the companies of the Latvian Information and Communication Technology industry (ICT), for example: AS “SAF Tehnika”, SIA “Mikrotīkls”, VAS “Latvijas Valsts Radio un Televīzijas Centrs”, SIA “Lattelekom”, SIA “TET", SIA ”Latvijas Mobilais Telefons", SIA “Tele2”, VAS “Elektroniskie sakari”, AS “Alfa”, AS “HansaMatrix”, SIA “HansaMatrix Innovation", Accenture Latvijas filiāle, SIA “UAVFactory”, SIA “Citrus Solutions”, AS “Draugiem Group”, SIA “Intelligent Systems”, SIA “AERONES", SIA “Vizulo”, SIA “Regula Baltija”, SIA “Baltic Scientific Instruments" etc. Yet, in-depth statistics are lacking regarding the employment of graduates.

2.1.5. Not applicable

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

Conclusions
The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field.

Strengths:
1. Study program fulfills a valuable economic role in providing the industry with specialists within the field.
2. The number of students is at relatively good levels.

Weaknesses:
none

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The professional Master study program "Smart electronic systems" is implemented in two versions according to the study courses completed on the Bachelor study level:
1) 60 CP – for the graduates of the professional Bachelor study program with a successful internship of at least 20 CP - received a professional bachelor’s degree in electrical engineering and qualification of electronics engineer or similar education. Duration of the Master studies - 1.5 years;

2) 80 CP – for the graduates of the academic Bachelor program - received Bachelor's degree in engineering in electronics and automation or similar education. Duration of the Master's studies - 2 years.
The volume of the compulsory study courses in the study program is 23 CP. The volume of compulsory elective courses - professional specialization study courses, is 11 CP. Students select from 14 study courses, the total volume of which is equal to 38 CP. The professional study courses conform to two basic directions of the electronics industry, namely, the smart embedded systems, which comprise programming of microprocessors, software design for field-programmable gate arrays, and development of integrated circuits; and smart wireless communication systems, which comprise 5G wireless technologies, data transmission on wireless sensor networks, software-defined radio systems, microwave technique, signal processing. In compliance with selected and completed study courses, more narrow specialization is possible within both basic directions.

According to both versions of the program's implementation, the volume of compulsory study courses and professional specialization study courses in the study program is the same. The main difference relates to the completion of the Internship. In the version of 80 CP, students complete the Internship for 20 CP and the applied research internship for 6 CP. In the version of 60 CP, students only have the applied research internship. Master's Thesis for 20 CP.

The content of the master study program “Smart electronic systems” generally complies with the standard of profession of the Leading Electronics Engineer. Therefore, both formally and in fact, the content of the study program is topical and corresponds to specific industry needs.
However, during the meeting with employers, several drawbacks regarding the content were identified. Employers expressed concern about the low level of programming skills among graduates. A review of the content of the study program shows that there are several study courses clearly devoted to embedded programming - Application of Microprocessors and Microcontrollers (RRI702) and Signal Processing in Heterogeneous Systems Containing FPGA (RTR710). However, according to the course description, the Application of Microprocessors and Microcontrollers is a beginner-level course requiring no prior knowledge of embedded systems programming. Overall, the content of the course is good and well-planned, but the delivered learning outcomes are quite far from the needs of the industry. For example, one of the four learning outcomes is “Is able to apply practical skills for introductory level problem solution”. The study course Signal Processing in Heterogeneous Systems Containing FPGA (RTR710) is more targeted to FPGA-based systems. This study course is topical and well-planned, but also doesn’t increase the programming skills significantly.

Employers pointed to the need to improve the teamwork and presentation skills of graduates. Such skills are required by applied professional standards as well since the standard describes the leading electronics engineer. However, there is no study course dedicated to general skills (e.g. teamwork, presentation, project management) among the compulsory study courses. There are only two general skills courses: Civil defense (ICA104) and Environment and Climate Roadmap (VAS038), and it’s clear the objective of these courses is not related to improving the teamwork and presentation skills of graduates, etc. Although there is a study course Innovation Management (RRI488) within compulsory elective study courses of the study program, students can simply skip this course by preferring more technical courses. As a result, no clear evidence was found on how students can improve their general skills required by professional standards and employers.

2.2.2. According to SAR and interviews, the final requirement for the Master's degree is the defense of an individually designed Master's thesis. The Master's thesis defense demonstrates the student's ability to analyze and apply ideas described in the professional and scientific literature in the field of

electronic engineering, as well as to independently develop a project in the field of technology. According to SAR, the master's thesis must be publicly defended in front of a State Examination Commission. The commission operates in accordance with regulations approved by the University Senate and consists of both university academic staff and industry professionals. Topics of graduation papers are analysed and summarised in SAR pp. 516-519 and are as follows: Electroacoustics; Signal and image processing; Electronics elements, measurements; Embedded systems; RF and wireless communication systems.
During the last three years, the Institute of Radioelectronics has had considerable achievements in its scientific activity regarding approval of scientific projects, including grants to Master students, and an increased number of publications, including the number of Master students as co-authors.
The outcomes of the study program are defined in compliance with the requirements defined by the profession standard "Leading electronics engineer" by structuring the outcomes according to the knowledge, skills, and competencies to be acquired.

2.2.3. There is a certain list of classical teaching methods well established and used on a daily basis to achieve the aims and learning outcomes of the study program: lectures or practical classes, group work, or independent work (both at home or in the facilities of RTU). The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.
The experts' visit found that student-centered methods are sometimes used, but unfortunately, most of the teaching staff did not give the impression that they would use such methods in their teaching practice. On the contrary, during the discussion, the impression was that many of the teachers were hearing about such methods for the first time. Moreover, no evidence of the use of such methods was available in the self-assessment report.
On the positive side, a learning-by-doing approach is actively used and supported during studies.

2.2.4. According to the curriculum plan, within the scope of the study program, depending on the program version (60 CP or 80 CP) the following study types of internship are provided: Internship (20 CP) and/or Applied research internship (6 CP). For students who have previously completed the professional Bachelor study program, including the Internship, it is only necessary to attend the Applied research internship aimed at provision of the additional practical work experience in a company or institution of the electronics profile. According to SAR pp. 514, "The Internship aims to provide the practical work experience needed for receiving the professional qualification for the student at a company or institution of electronics profile outside RTU. During the Internship, students get acquainted with the structure and work organization of the internship company and the technical-economic performance. Students have an opportunity to learn the modern scientific and innovative technical solutions in smart electronic systems and get acquainted with labor safety, safety technique, environmental protection, and electromagnetic compatibility standards, and their technical and organizational solutions", which is, in all, well related to the learning outcomes.
The Internship is organized in compliance with the Senate decision on the Procedure of the organization of the Internship at RTU (Approved at the Meeting of RTU Senate on 28 January 2019 (Minutes No 626). The procedure of organization of the Internship at RTU stipulates the procedure for organizing and managing internships at Riga Technical University. The description of the procedure is a high-level document covering all professional study programs of RTU.
According to the SAR, the Latvian Electrical Engineering and Electronics Industry Association (LETERA), with approximately 95 active members registered as of the beginning of 2022 - large and small companies of the industry, also provides important support for internship placements. During meetings with employers, the experts were convinced that the students and the teaching staff of the

study program have very close and regular connections with the industry. As a result, no factors were identified in both SAR or the expert's visit that could create obstacles to finding and achieving a successful internship.
The study program is also implemented in the English language. According to SAR, the provision of internships for foreign students is organized in the same way as for local students. Additional support is provided for the Department of International Cooperation and Foreign Students, which participates in negotiations with students and potential internship providers by explaining formal requirements as necessary.
However, neither the SAR nor the results of the expert's visit provide any evidence of the provision of internship in English.

2.2.5. Not applicable

2.2.6. The SAR contains a list of all the topics of the master theses during the evaluation period. They are all related to the field of study and the content of the program.
In the year 2018, the content of the study program was substantially revised, and the title of the program was changed from "Electronics" to "Smart electronic systems". Improvement of the content of the study program was implemented with the active participation of the industry representatives resulting in the addition of study courses from the academic program "Electronics" (where enrolment of students was discontinued), which conform to two strategically selected perspectives directions: 1) Smart embedded systems; 2) Smart wireless communication systems.
The first graduates of the renewed study program are the graduates of the academic year 2020/2021 the topics of whose graduation papers also conform to the selected directions. It is expected that, in compliance with the needs of the industry, the graduates of the next year will continue developing the direction of embedded systems in their Master Thesis by focusing mainly on the development of FPGA, SoC, and, ASIC, as well as more papers will be devoted to the signal processing, as relevant study courses were included in the program and students have successful internships at the Institute of Electronics and Computer Sciences, where it is among the basic directions of activity. It should be highlighted that, during the expert's meeting with employees, a strong connection between the master-level students and the Institute of Electronics and Computer Sciences was identified.

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

Conclusions
The content of the study program is mostly aligned with the main necessities of the industry, being topical and aligned with the current state of knowledge. The study program is offered in Latvian/ English for two durations (2 years/ 1.5 years), trying to accommodate as many candidates as possible. The completion of the study program entitles the graduate to the receive the professional Master degree in electronics and the professional qualification of a leading electronics engineer.

Strengths:
1. A strong connection between the master-level students and the Institute of Electronics and Computer Sciences.
2. Wide choice of topical compulsory elective study courses.

Weaknesses:
1. The programming skills of the graduates do not meet the requirements of the industry.
2. The general (teamwork, presentation, project management, etc) skills of the graduates do not meet the requirements of the industry.

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

As shown in criteria 2.2.1 to 2.1.6, the study program focuses fully on its declared aim; all criteria are satisfied.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the master study program “Smart Electronic Systems”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). For the provision of the study program, there is a minimum of 108 books in Latvian and minimum of 626 books in English available in the RTU library. Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
The study program is mainly sustained by some specialized laboratories and centers: the Institute of Radioelectronics; Departments of basic electronics; Department of electronic devices; Department of radio devices; Institute of Telecommunications; Department of transmission systems; Department of telecommunication networks; Department of telematics and transport electronic systems.
In addition to the basic study laboratories, students can also use the specialized laboratories located on the ETF premises: Wireless sensor network and software-defined radio laboratory; Laboratory of Electroacoustics; Prototyping laboratory; Siemens IoT laboratory; Electronic devices testing center of Latvia (LEITC); Electronics club.
The courses of the master study program are provided mainly by the teaching staff of the Faculty of Electronics and Telecommunications.
According to the SAR pp. 527-528, the master study program “Smart Electronics Systems” has an equivalent allocation of some 40 state-funded seats per year, with an own budget of some 280k euros/year. This seems to be sufficient for sustaining the number of enrolled students and ensuring the resilient development of the program.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the master study program “Smart

Electronic Systems” has an equivalent allocation of some 40 state-funded seats per year, with an own budget of some 280k euros/year (which includes foreign tax-paying students). Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits. Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
It should be noted that the program involves the use of special hardware, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware platforms. The SAR does not mentions a planning of the replacement/ upgrade of such components.
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is the need of minimum 19 students for a bachelor/ master study program in order to have financial profitability. The current program has on average over 30 students enrolled in the first year (on average over the last 4 years, according to SAR pp. 505).

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) such that the master study program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) supports the program's implementation. It should be noted that the program involves the use of special hardware, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware platforms.

Strengths:
1. Very good access to scientific databases and e-learning technologies.
2. Very good industrial cooperation.

Weaknesses:
1. The planning of the hardware replacement/ upgrade is apparently not performed and included in the financial planning.

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 provisions are sufficiently met to insure the achievement of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report (SAR pp. 530, Table) and in the Annexes to SAR submitted for evaluation, the teaching staff of the master study program “Smart Electronic Systems”

consists of 14 persons, out of which 3 Assoc. Professors, 7 Assistant Professors, 3 lecturers, 1 assistant - 6 persons hold a doctoral degree (all but 2 assistant professors). The remaining 8 teaching staff don't have a scientific degree but possess sufficient practical work experience compliance with the relevant study course. Lecturers and assistants who do not have scientific and academic degrees have practical work experience in electronics manufacturing companies amounting to five or even more years. The study program is implemented for less than 250 students. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

2.4.2. As presented in the Self-Assessment Report, the teaching staff of the master program “Smart Electronic Systems” has changed significantly (6 teaching staff in 2013 - mean age 68 years, 14 teaching staff in 2022 - mean age 49 years) with respect to the previous evaluation (just 1 assoc. prof. remains from the teaching staff from 2013, as shown in SAR pp. 530-531 Tables). As observed in 2.4.1, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure; still, there is no available documentation regarding any specific provision on staff change at the University/ Faculty level.

2.4.3. Not applicable

2.4.4. As presented in the Self-Assessment Report pp. 94, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”. The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria.
The Self-Assessment Report of the program (page 531) does not mention any information about publications of the teaching staff (although these publications exist). The annexes to the 2.4. Scientific Research and Artistic Creation chapter of the SAR (pp. 85-104) (P24_2.4.4_Publikacijas_LV_Publications_ENG, P24_2.4.4_Patenti_LV_Patents_ENG, P23_2.4.4_Jaunrade_LV_Creation_ENG) list all the publications, patents and creations of the teaching staff involved in all the programs from the evaluated study field. The publication list spans 494 pages and lists almost 6000 titles. It is very hard to identify within this list the contributions related to a specific study program, but the general impression is that the teaching staff is actively involved in research and produces publishable results.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU (email, chat and video conference tools, Moodle/ ORTUS), access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 14 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) toward successfully implementing the study program.

Strengths:
1. The teaching staff shows good academic and industrial expertise.

Weaknesses:
1. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
2. There are no documented provisions regarding managing the changes in teaching staff.

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

There is full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06 (P06_3.2.1_EGV0(47523)_Compliance with the state education standard _ProfMag_EN.pdf) confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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: Fully compliant

Annex P07 (“P07_3.2.1_EGV0(47523)_Compliance with the professional standard_Prof.Mag._EN.pdf”) confirms that the program is compliant with the Leading Electronics Engineer professional standard

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

(“P28_3.1.2_EGV0(47523)_DiplPielik_LV_DiplSupplemt_ENG.zip”) are prepared in Latvian and English. Descriptions comply with regulations set forth in 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 sample (“P28_3.1.2_EGV0(47523)_DiplPielik_LV_DiplSupplemt_ENG.zip”) complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - valsts valodas zināšanas.edoc”) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation . Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (“Apliecinājums - svešvalodu prasme.edoc”) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU academic master study program “Telecommunication Technologies and Networks Management”.

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

RTU confirmation (Apliecinājums - par zaudējumu kompensāciju.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

Study program fully complies with regulatory enactments.

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

The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field. The university has allocated all needed provisions (scientific, informative, material, technical and financial) to implement the study program efficiently and correctly. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. The study program fully complies with the regulatory enactments.

Strengths:
1. Study program fulfills a valuable economic role in providing the industry with specialists within the field.
2. The number of students is at relatively good levels.

Weaknesses:
1. The graduates' programming skills do not meet the industry's requirements.
2. The general (teamwork, presentation, project management, etc) skills of the graduates do not meet the industry's requirements.

Evaluation of the study programme "Smart Electronic Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Smart Electronic Systems"

Short-term recommendations

1. Analyze whether the programming and embedded programming skills gained during the studies are relevant and sufficient to current industry needs, and introduce changes in the study content if provided skills do not meet the requirements of the industry.
2. Analyze whether the teamwork and presentation skills gained during the studies are relevant and sufficient to current industry needs and introduce changes in the whole study program content or specific course content if provided skills do not meet the requirements of the industry.
3. Introduce a course of study in the compulsory elective part of the study program that provides in-depth skills in embedded systems programming.

Long-term recommendations

1. Consider the planning of the hardware/software replacement/ upgrade and include the cost estimates in some financial planning.
2. Consider the documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
3 Consider a procedural and documented management of the changes in teaching staff.

II - "Computer Systems" ASSESSMENT

II - "Computer Systems" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The contents of the study program are oriented to software engineering, information technology, computer science, and also computer engineering and computer control. (SAR, p. 131) Most of the courses of the program (Annex P09_3.2.1_DGD0(47526)_Plans_lv_Plan_eng.pdf) cover topics of ICT. The content is fairly close to the corresponding academic master's study programme..

2.1.2. The title of the study program is Computer Systems.
The code of the study program – 47526 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitibas-klasifikaciju), corresponds to the following codification: meaning of the first two digits `47` notes that this study program is a professional master program and the last three digits `526` indicate that this study program is related to the educational group of “other engineering sciences”).
The degree to be acquired: Professional Master Degree in Computer Systems.
Qualification to be obtained: Systems Analyst or Leading Programming Engineer.
The 10 tasks (objectives) of the program correspond to the goal to prepare professionals in accordance with the 5th-level leading programming engineer professional qualification standard (majoring in applied computer system software and in applied computer science) or system analyst professional qualification standard (majoring in Computer System Design).
The results of the study program (learning outcomes) are adequate (9 outcomes) for the professional master's degree and comply with the aim and objectives of the study program. Learning outcomes include both theoretical knowledge and practical skills and competencies in software development, as well as the ability to analyze and communicate things.
The described parameters of the study program are reasonable and interrelated.
Study type, form, and volume (2 implementation variants) –
● Full-time studies with a duration of 1.5 years (60 CP/90 ECTS) implemented in Latvian,
● Full-time studies with a duration of 2 years (80 CP/120 ECTS) implemented in Latvian.
Admission requirements are different for both variants (SAR, pp. 131, 132):
* for the short variant (60 CP) - Professional Bachelor Degree in Computer Systems or comparable education and professional qualification of Programming Engineer
* for the longer variant (80 CP) - a Bachelor's Degree of Engineering Science in Computer Systems or comparable education by fulfilling additional requirements.
Admission requirements comply with the state regulations, where persons with a bachelor's education can apply for the study program "Computer Systems". Differences in admission requirements give the opportunity to:
* have shorter studies if appropriate professional bachelor studies have been completed,
* study with different bachelor studies completed.
Study volume, duration, and implementation forms are reasonable and justified.

2.1.3. Classification code was changed to 47526 (in accordance with Latvian Republic Cabinet Regulations No. 322 of 13 June 2017). (SAR, p. 128)
The volume of the program was changed from 62 CP in 2013 to 60 CP in 2022 (in accordance with Latvian Republic Cabinet Regulation No. 512 adopted on 26 August 2014 “Regulation on the State Standard of the Professional Higher Education of the Second Level”). (SAR, p. 128)
In conformity with the newly developed professional standards, the qualification awarded upon the completion of the study program has been changed, awarding all graduates the qualification corresponding to the 7 LQF level - either the qualification of system analyst or leading programming engineer. (SAR, p. 129)

2.1.4. Graduates of engineering and IT sciences are in wide demand in the labor market, as can be seen from the advertisements. (SAR, pp. 132, 133)
Graduates of the study program are well prepared for building their careers in senior positions in ICT companies, 93% of the graduates are employed one year after graduation, and 97% of them are in higher qualification professions according to the Ministry’s classification. (SAR, p. 133)
According to Annex P05_3.1.4_DGD0(47526)_StatistikaparStud_LV_StatisticsonStudents_ENG.pdf, in recent years, the annual number of admitted students 13-57, making the total actual number of

students in the program 39-93, whilst the annual number of graduates is 4-15, with the tendency to decrease in the last years (4 graduates in 2020/2021) while the corresponding academic program had 93).
All students are state-funded.

1.5. Not applicable

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

Conclusions
The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient.
The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and internal requirements after graduating from high school as well as benefiting from having acquired an appropriate professional bachelor's education.
The title, code, and degree of the study program are reasonable and interrelated and match the requirements.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.

Weaknesses:
1. Significant overlap with the corresponding academic master's study program.
2. Decrease in the number of students and graduates.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 135-137) and the Annexes to it, and in the interviews conducted during the visit as well. The goals and tasks of the study program have been defined according to the qualifications that students acquire by graduating from the program, namely Systems Analyst (majoring in Computer System Design) and Leading Programming Engineer (majoring in applied computer system software and in applied computer science). Acquiring the qualification of Systems Analyst is ensured by achieving the goals corresponding to the compulsory part of the program and the goals corresponding to the specialization “Computer Systems Design”. Similarly, the goals of the compulsory part of the program together with the goals of the specializations “Applied Computer System Software” and “Applied Computer Sciences” ensure acquiring the knowledge and skills necessary for Leading Programming engineers.
Part A of the first implementation variant of the study program (20 CP) includes compulsory study courses, where students obtain knowledge and skills complying with the occupational standards of both system analysts and leading programming engineers. Part A of the second variant of the program (23 CP) also includes courses for obtaining technological fundamental knowledge of the industry.
The courses of Part B1 of the program are grouped into three specializations, namely Design of Computer Systems, Applied Computer System Software, and Applied Computer Sciences. Every student selects compulsory elective courses appropriate for the specialization and obtains the corresponding qualification: Design of Computer Systems corresponds to the qualification of system analyst and the other two specializations correspond to the qualification of leading programming

engineer. The role of compulsory elective courses is to obtain different knowledge and skills complying with the occupational standards of system analyst and leading programming engineer. In the first implementation variant of the program, part B1 accounts for 10 CP, and in the second variant for 7 CP. Part B2 (4 CP) allows students to select humanities and social courses that develop their basic social, communicative, and organizational skills.
As the study program has a professional inclination, a minimum of 50% of classes in professional courses are practical and laboratory work. Moreover, during the lectures, the academic staff devote special attention to the usage of technologies for solving real tasks, thus ensuring that a leading programming engineer or a systems analyst masters the required knowledge and skills as much as possible. The need for enhanced soft skills among graduates has been noted by employers.
Annex P08 P08_3.2.1_DGD0(47526)_Kartejums_lv_Mapping_eng.pdf of the self-evaluation report provides a comprehensive mapping of the learning outcomes of the courses against those of the program. The mapping indicates that the achievement of the former leads to the achievement of the latter.
The courses are regularly updated, as is also the curriculum, so as to ensure the provision of relevant content, in line with the needs of the labor market and the trends in the IT field.
Annex P06 (P06_3.2.1_DGD0(47526)_AtbilstibaValstsStandartam_ProfMag_LV.pdf) of the study program self-evaluation report provides a comprehensive mapping of the requirements for compliance of the study program with the state education standard Cabinet Regulations No. 240 of 13 May 2014 “Regulations on national academic education standards” https://likumi.lv/doc.php?id=266187 (In Latvian)
Annex P07 (P07_3.2.1_DGD0(47526)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf) presents the outcome of the evaluation of the program for compliance with two Occupational Standards, namely the standards of Leading Programming Engineer and Systems analyst. The analysis showed that the courses included in the study program ensure that students fully acquire the necessary knowledge for performing the professional tasks of a Leading Programming Engineer or Systems Analyst. However, the same Annex states that according to the Latvian ICT association (LIKTA), the current version of the pertinent professional standard (approved in 2009 and available at https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0227.pdf) is outdated and does not reflect the actual needs of the industry. The study program has been evaluated based on a working version of the occupation standard developed by a working group organized by LIKTA and submitted for approval in March 2022. The approval of the standard is expected within 2022. However, if the new occupation standard is not approved, a risk of the program not being able to receive accreditation exists.

2.2.2 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 137-139) and the Annexes to it, and in the interviews conducted during the visit as well. The final requirement for obtaining the degree is the writing and defending of a Master’s thesis with a project part. The Master Thesis with a project part is a combination of independent research and practical development, which is developed through direct cooperation with academic and research staff of the Institute of Applied Computer Systems, with an account of the industry needs and topical problems of the field. The thesis and its defense demonstrate the student’s ability to analyze, classify, and compare ideas rendered in scientific research and technical resources in the field of computer science and information technology, to obtain, summarize, analyze and assess data by applying methods, methodologies, technologies, computer systems and development tools and languages to solve tasks, formulate problems, integrate the obtained knowledge and express assumptions on possible innovative solutions to these problems. As a result of the Master Thesis, the students propose a scientific innovation in the field of computer science and information technology. The thesis is expected to produce publishable research results. The degree is awarded on the basis of the public presentation of a reviewed research – the Master Thesis with a project part – and the

results of the course examinations. Additionally, the academic staff and students of the study program regularly carry out research and participate in scientific projects.

2.2.3 Lectures, practical classes, laboratory and independent work implemented individually and in groups, tests, and a graduation paper are employed as teaching methods, at the discretion of the instructors. The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs.
The students are offered a wide variety of learning materials (documents, presentations, video recordings, interactive learning materials, etc.). They have the right to propose their own topic for the Master's thesis, thus achieving learning outcomes in an area that interests them. Additionally, they have the opportunity to receive individual tutorials from the academic staff involved in the study program. Further, a wide range of extra-curricular activities is offered to the students.
As stated above, Annex P08 P08_3.2.1_DGD0(47526)_Kartejums_lv_Mapping_eng.pdf of the self-evaluation report provides a comprehensive mapping of the courses against the program learning outcomes and the report itself argues convincingly on how these outcomes are achieved.
2.2.4 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 143-145) and the Annexes to it, and in the interviews conducted during the visit as well. Following mastering theoretical study courses, the students extend and consolidate professional knowledge in practice. The volume of internships differs between study program implementation variants. In the first variant of the study program (60 CP), the volume of the internship is 6 CP. In the second implementation variant (80 CP), the internship amounts to 26 CP. The study program has two qualifications, which also determine the internship tasks. During the internship, students get acquainted with the company structure and its operation organization, as well as the technical and economic indicators of the undertaking. The students are provided with an opportunity to master the latest scientific and innovative technical solutions in the field of software engineering. The internship is organized in the first and second year of studies, in both semesters. The volume of the internships in the second semester is 6 CP for both study program implementation variants. Internship in the third semester (20 CP) is implemented only for the second implementation variant (80 CP).
Regardless of the seeming similarity of aims and tasks of both variants, the difference is in the complexity of the tasks to be solved. In the second variant of internship (26 CP), the time spent for an internship at an undertaking is much longer; this allows students with insufficient practical skills to start with simple work tasks and, towards the end of their internship, be capable of solving tasks of the complexity corresponding to the occupational standards.
In all variants of the internship implementation, students learn how to work in a team. Moreover, the internship manager at the undertaking controls the fulfillment of internship tasks in compliance with the deadlines set in accordance with the requirements of the undertaking and the study program. During the internship, regular consultations with the internship manager at the undertaking and the internship coordinator at the university are anticipated in accordance with the instructions of the organizational unit. The internship results are submitted in the form of a report in accordance with the instructions of the organizational unit and are publicly presented at the end of the second semester in the case of internships amounting to 6 CP and at the end of the second and third semesters in the case of internship amounting to 26 CP.

2.2.5 Not applicable

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 145-147) and the Annexes to it, and in the interviews conducted during the visit as well. During the reporting period, 77 students graduated from the program, having also completed their Master's thesis. The program offers students thesis topics related to both traditional and fundamental

approaches to software development, as well as topics related to the application and research of modern technologies and methods. The Institute of Applied Computer Systems maintains productive collaborations with industry, thus many students select thesis topics defined by and relevant to the industry. The topics of the thesis lie in the fields of Information system models and projects; Assessment and analysis of technology and algorithm application; Data processing and storage; Research of safety solutions; Development of software systems for different areas.
The following software systems have been developed in the project part of the Master Thesis: accounting systems, workflow, and document management systems, financial systems, educational institution work support systems, chat environments, transport, and logistics field systems, website solutions, applications and portals, user support systems, computer games, geolocation-supported systems, personalized systems, 3D scanning. Most theses are on topics that directly correspond to software development for various fields.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations. The awarding of a degree is based on the achievements and findings of the relevant field of science. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The opportunities and provision of internships offered to the students, as well as the organization of the work, are effective. The tasks of the internship are related to the learning outcomes and the internship complies with the requirements of regulatory enactments. The topics of students' final theses are relevant to the field and correspond to the study program.
Strengths:
1. The study program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The teaching and learning methods employed are in most cases student-centered.
5. The organization of the internship is effective and the tasks are related to the learning outcomes.
6. The topics of the Master’s thesis are relevant to the program.

Weaknesses:
1. The soft skills of the graduates need further enhancement.
2. Student-centered teaching and learning approaches are not employed in full.
3. If the new professional standard is not approved, a risk of the program not being able to receive accreditation exists.

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

All criteria are satisfied. No major shortcomings have been identified.
Some weaknesses are identified.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
As a part of the IT provision, students have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students are provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support. Moreover, RTU provides Microsoft Azure cloud computing and access to the high-performance computation center.
The study program is supported by general laboratories as well as specialized robotics and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state (24 state-funded budget seats). From 2013 to 2021 funding was between 117 419 to 237 809 Euro per academic year. In 2019/2020 it dropped to the lowest 117 419 Eur, but in 2020-/2021 it was back to 171 701. It is sufficient to support the program.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. Not applicable

2.3.3. RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well supported by the faculty and university, funding is sufficient as well. A deeper analysis of the funding drop in 2019/2020 could help avoid or at least control such situations.

Strengths
1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

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 provisions are sufficiently met to insure the achievements of the learning outcomes

2.4. Teaching Staff

Analysis

2.4.1. According to the SAR (pp. 151, 158), the total number of teaching staff in the study program is 29 (including 24 with a doctoral degree).
The responsible instructors of the courses are appointed by the head of the responsible structural unit. Instructors responsible for study courses can be professors, associate professors, and assistant professors with a scientific degree in the relevant branch or sub-branch of science. (SAR, p. 151)
All responsible instructors involved in the implementation of the study program hold doctoral degrees, but in total, 83% of the academic staff involved in the implementation of the study program hold doctoral degrees; the number of guest teaching staff is 4 (total during the reporting period). (SAR, p. 151)
Guest lecturers from IT companies in Latvia are involved (e.g., Emergn AS Citadele banka) (SAR, pp. 151, 152).
Since 2019, one staff member has visited the State University of New York at Buffalo, USA for a semester-long internship. (SAR, p. 152)
The qualification of the teaching staff is fully compliant with the requirements of the study program.

2.4.2. In many cases, young colleagues start their careers at the Institute of Applied Computer Systems already during their studies by getting involved in research projects. (SAR, p. 155)
At two departments there were changes in teaching staff - at the Department of Artificial Intelligence and Systems Engineering, and at the Department of Software Engineering (14 changes in total listed by SAR, pp. 155, 156).
In the case of these academic staff changes, no significant changes in student feedback have been observed. The following principle is being obeyed the quality of the implementation of the study course must not be reduced by the arrival of new academic staff. (SAR, p. 156)
The changes made to the study program by younger academic staff give confidence in the quality of implementation of the study program and do not negatively affect it.

4.3. Not applicable

2.4.4. According to SAR (pp. 152-154) and Annex 2.4.4_PublikacijasPatenti_LV_PublicationsPatents_ENG.zip teaching staff has participated in different research activities and produced a number of scientific publications.

2.4.5. All changes in the study program, as well as significant changes in the study courses, are discussed in the Council of the Institute of Applied Computer Systems, an important structure supporting the study program. Responsible instructors are appointed for the courses. (SAR, p. 157)
Academic staff also share their experience on other issues such as students' academic integrity,

graduation papers, and conflict resolution. (SAR, p. 158)
The number of students per academic staff in the study program is 2.11. (SAR, p. 158)
Mutual cooperation of the teaching staff enables the successful implementation of the study program.

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

Conclusions
The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. Experienced and well-motivated academic staff.

Weaknesses:
none

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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

Annex P06_3.2.1_DGD0(47526)_AtbilstibaValstsStandartam_ProfMag_LV.pdf confirms that the study program complies with Cabinet Regulation No. 512 “Noteikumi par otrā 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 P07_3.2.1_DGD0(47526)_AtbProfStand_LV_ComplOccupationalStand_ENG.pdf confirms that the program is compliant with the Leading Programming Engineer professional standard; but the standard has not yet been approved.

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 P10_DGD0(47526)_StudijuKursuapraksti_LV.zip are prepared in Latvian. Descriptions comply with regulations set forth in 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 sample P28_DGD0(47526)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation.. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Sample of the attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

Annex P15_2.1.4_StudijuTurpin_StudyContinue.zip . RTU confirmation indicates that students have the opportunity to continue studies in the RTU study program “Information Technology Project Management” (prof. master) or in relevant study programs at Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edocNr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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 study program complies with regulatory enactments, but the professional standard is not yet approved.

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

The aim, tasks, and learning outcomes of the study program are correctly formulated and correspond to the state and internal documents. The aim, tasks, and results of the studies are mutually compatible and do not contradict each other, and are sufficient. The study results are fully in line with the goals of this qualification. Admission to studies is made according to external and

internal requirements after graduating from high school as well as benefiting from having acquired an appropriate professional bachelor's education. The title, code, and degree of the study program are reasonable and interrelated and match the requirements. The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations. The awarding of a degree is based on the achievements and findings of the relevant field of science. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered but not always employed. The opportunities and provision of internships offered to the students, as well as the organization of the work, are effective. The tasks of the internship are related to the learning outcomes and the internship complies with the requirements of regulatory enactments. The topics of students' final theses are relevant to the field and correspond to the study program. The program is well supported by the faculty and university, funding is sufficient as well. The qualifications of the academic staff comply with the conditions for the implementation of the study program and the requirements of the regulatory enactments.

Strengths:
1. High demand for specialists in the industry, and good perspectives for them in terms of income.
2. Increasing number of self-paid students.
3. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.

Weaknesses:
1. Significant overlap with the corresponding academic master study program having the same name.
2. Decrease in the number of students and graduates.
3. If the new professional standard is not approved, a risk of the program not being able to receive accreditation exists.

Evaluation of the study programme "Computer Systems"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Computer Systems"

Short-term recommendations

1. Analyse funding drop in 2019/2020 to mitigate future risks.
2. One recommends that a thorough analysis is performed regarding the simultaneous existence of study programs having exactly the same name but different types (academic/professional), different duration, or different levels (bachelor/ master)

Long-term recommendations

1. Activities that will enhance the students’ soft skills need to be included in the content.
2. Student-centered teaching and learning methods need to be employed in all courses.

3. RTU needs to plan for mitigating the risk of the new occupation standard not being approved.

II - "Computer Science and Information Technology" ASSESSMENT

II - "Computer Science and Information Technology" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. The doctoral study program “Computer Science and Information Technology” is part of the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”, for which it is a perfect fit. The program is fully compliant with the study field.

2.1.2. The academic doctoral study program “Computer Science and Information Technology” is coded as 51482 which combines natural sciences, mathematics, and information technologies; the title issued upon graduation is Doctor of Science (Ph.D.) in Electrical Engineering, Electronics, Information and Communication Technologies or Doctor of Science (Ph.D.) in Mathematics; the study duration is 4 years (192 credit points); the teaching language is Latvian or English.
For awarding the Ph.D. degree in Mathematics, RTU has entered into an agreement with the Doctoral Council of the Field of Mathematical Sciences of the University of Latvia on the provision of opportunities for RTU students to obtain a doctorate (SAR, page 1080).
The admission requirements (preconditions), as described in the SAR pp. 1065 are based on holding a master's degree: “1) Master's degree in electrical engineering, electronics, information and communication technologies or Master's degree in natural sciences in computer science and informatics, or Master's degree in natural sciences in mathematics, or compatible education; 2) Master's degree in engineering sciences or Master's degree in natural sciences, or Master's degree in social sciences, or compatible education with preconditions that Candidates should have at least 30 CP worth of courses in the areas of computer science and information technology and mathematics including courses on mathematics, statistics, programming, databases and computer networks. To qualify for the Ph.D. in mathematics a candidate should have had courses in mathematical analysis, time series analysis, and random processes.”. No specific selection/ ranking methodology of the candidates is described or referenced in the SAR.
The declared goal of the program is “to prepare highly qualified specialists and researchers in the area of:
1) Electrical engineering, Electronic engineering, Information engineering with specialization in systems analysis, modeling, and design; or
2) Mathematics with specialization in applied mathematics and mathematical modeling or probability and mathematical statistics, who are able to carry out state of the art research and solve complex real-life problems.”, which seems appropriate and justified in relation to the code, duration, and qualifications of the program. Still, the name of the program “Computer Science and Information Technology” does not fit very well with its content, since the content is electronic engineering, information engineering and mathematics; especially the “Computer Science” part is misrepresented. Graduates of the study program work Graduates work in higher education institutions (~30%) and industry (~70%).

2.1.3. The doctoral study program "Computer Science and Information Technology" was licensed on 14 July 2021. It combines three previously implemented study programs of the Faculty of Computer Science and Information Technology – "Computer Systems", "Information Technology" and

"Automation and Computer Management", in which students are no longer enrolled. No changes have been made to the parameters of the study program since licensing.

2.1.4. As described in the Self-Assessment Report, and fully acknowledged in the evaluation for an international scale, “Information technology is one of the most significant and fastest growing sectors of the Latvian economy, which constantly needs young specialists”. As such, the need and justification for a study program that trains IT specialists are obvious. The unemployment ratio among program graduates is zero, which is rather expected (although the presented data are rather old, from the 2017/2018 state survey).
The doctoral study program “Computer Science and Information Technology” starts on average with 17 students in the first year (the average over the last 8 academic years); in the final year of study (the fourth), on average, there are 12 students enrolled. It should be also noted that in the last four years, the number of enrolled students dropped significantly by some 50%. The average number of graduates (defended Ph.D. theses) is 4, which represents 25% of the total admission and 33% of the students in their final year. These numbers represent a high dropout of students, in both the first year of study and in the last year of study (failure to prepare/defend the Ph.D. thesis).
The Self-Assessment Report does not elaborate on the analysis of the graduation ratio and does not propose corrective actions.

2.1.5. Not applicable.

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

The program title is compliant with the study field. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements (although the specific ranking criteria for the candidates are not explained). The program received no changes from the last evaluation. The program is fully justified and aligned with the requirements of the global research environment, although its name seems somehow mismatched with the declared goals (the university lists as goals electrical and electronic engineering, mathematics and modeling, and information engineering; no computer science or information technology per se are mentioned).

Strength:
1. The holders of Ph.D. are 100% employed.

Weakness:
1. There is an apparent mismatch between the name of the study program and the goal and specialization developed within (the “Computer Science” part seems underrepresented, since the university lists as goals electrical and electronic engineering, mathematics and modeling and information engineering; no computer science or information technology per se are mentioned).
2. There is the need to perform internal assessments on the dynamic of students and prepare corrective actions, as only 25% of the first year students graduate and the overall number of admission has decreased.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The courses and modules are interconnected and complementary. Studies last four years, during which compulsory study courses, specialization, and free elective study courses are available from the university. The necessary knowledge for every Ph.D. student is offered as compulsory study courses. Compulsory elective courses include professional specialization study courses. According to

the SAR, the study courses are in the fields of electrical engineering, electronics, information, and communication technologies, as well as in the fields of applied mathematics and mathematical modeling or probability theory and mathematical statistics of the field of mathematics. The courses support achieving of learning outcomes and are necessary for performing deep scientific work. The content of the courses is aligned with the current trends of the industry and science. The SAR states that the study program contents comply with the RTU regulations. Significant changes are reviewed by the Field Committee of the field "Information Technologies, Computer Engineering, Electronics, Telecommunications, Computer Control and Computer Science", which also includes representatives of the industry. Operational changes are made in accordance with RTU Regulations "On the Use of RTU E-learning System in Delivery of the Study Courses".

2.2.2. According to the SAR, the Ph.D. study program is one of the cornerstones of the scientific development of the Faculty of Computer Science and Information Technology (FCSIT). The FCSIT has received a rating of "4" out of "5" in 2019 from the international evaluation. According to the evaluation, the program has a strong contribution to economic development. The aim of the study program is to educate and train highly qualified specialists and research staff. The FCSIT has defined the main research fields in the research areas of CS and IS which are aligned with the title of the study program and therefore the awarding of the degree is based on the achievements and findings of the relevant field of science.

2.2.3. According to the SAR, the study program implements student-centered learning by considering the diversity of the students and the variety of ways of study implementation while using different pedagogical methods and promoting mutual respect in the relationship between the students and the academic staff and providing students with opportunities to provide feedback. The studies are reported to be based on the Ph.D. student's individual work plan, which is created considering the needs of the doctoral student and the specifics of the Ph.D. thesis. The individual plan is created based on the model plan which can be modified based on the interrelation of the study courses.

2.2.4. Not applicable

2.2.5. The students have an opportunity to obtain a Ph.D. degree. The viva voce of the Ph.D. thesis takes place in accordance with Cabinet Regulation No. 1001. The student is promoted after successfully passing all examinations and credit tests specified in the Ph.D. study work plan, as well as developing the Ph.D. thesis. After submitting the Ph.D. thesis to the Doctoral Council it will be publicly defended. Depending on the degree to be obtained, the Ph.D. thesis is publicly presented either at the doctoral council (RTU P-07) or at the doctoral council of the field of Mathematical Sciences of the University of Latvia. According to the SAR, RTU has entered into an agreement with the Doctoral Council of the Field of Mathematical Sciences of the University of Latvia on the provision of opportunities for RTU students to obtain a doctorate.

2.2.6. The program was licensed on 14 July 2021 by joining previous programs. The topics of students' dissertations (from the previous programs and proposed in the current one) are relevant to the field of information technology and correspond to the study program. The Ph.D. theses are primarily in the relevant research areas. The curriculum of the study program is designed to provide in-depth knowledge in these fields. The recent years’ thesis topics seem to be better fitted to the study program.

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

The content is topical and meets the needs of the industry, labor market, and scientific trends. The awarding of a degree is based on the achievements and findings of the relevant field of science. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. The SAR states that the program is applying student-centered learning and teaching principles. The students have clearly defined promotion (doctoral thesis defense) opportunities. The topics of students' final theses are relevant to the field and correspond to the study program.

Strengths:
1. Clear study process and progress requirements.
2. Defined periodic student progress evaluation.
3. The program contributes to the development and sustainability of specific specialty terminology in the Latvian language (through the mandatory course delivery in Latvian).

Weaknesses:
1. Benefits or reasoning for offering the Ph.D. specifically as a mathematics degree is not clear, especially when all relevant staff and supporting systems are not available within the RTU.

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 themes approached in the program are relevant and of interest to the scientific field.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. According to the SAR, the study process is ensured by the academic and technical staff of FCSIT, including the following units of FCSIT and RTU: 1) FCSIT ITI Department of Modelling and Simulation; 2) FCSIT ITI Department of Management Information Technology; 3) FCSIT LDI Department of Applied Computer Science; 4) FCSIT LDI Department of Software Engineering; 5) FCSIT LDI Department of Artificial Intelligence and Systems Engineering; 6) FCSIT LMI Department of Engineering Mathematics; 7) FCSIT LMI Department of Probability Theory and Mathematical Statistics; 8) FCSIT NSA Department of Computer Graphics and Computer Vision; 9) Department of Computer Management and Computer Networks of the FCSIT NSA; 10) BIF Department of Water Engineering and Technology. RTU institutes and their departments ensure the training and methodological work: develop and update the curriculum, provide delivery of corresponding study courses, supervision and examination of final theses and carry out other activities related to teaching, methodological and research work.

Methodological and informative provision is based on the services provided by the RTU Scientific Library (SL). RTU Scientific Library is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure the RTU study process and research activities, as well as provides a library, bibliographic, and information services to RTU students, academic and general staff. The Library stocks more than 1.29 million printed documents and e-resources in RTU industry specific databases.

During the expert visit, it was identified that the library has an accessibility-based policy. The library is accessible to students 24/7. The extensive database is accessible remotely to the university staff and students through the ORTUS portal. The visit found no evidence that the library is not able to provide information support for the study program.
According to SAR, RTU provides funding for information resources for each study program according to certain financial calculations. The collection is replenished according to the recommendations of the heads of the study program, and researchers, in compliance with the allocated funding. Meetings with both teaching staff and students did not reveal any evidence of problems in the renewal of the library's information resources.
According to the SAR modern software that corresponds to educational needs and the current trends is used in the study process: FCSIT cloud computing platform “CloudStack”, MatLab, CPLEX, Microsoft, SAP, JetBrains, JIRA, ARENA, software tools ARENA VISUAL DESIGNER, ARENA INPUT ANALYZER, ARENA OUTPUT ANALYZER, OPTQUEST for ARENA and SIMUL8, etc. During the visit and meetings with RTU staff and students, there was no evidence of any problems with the available software resources.
RTU students and academic staff can also use the modern computing infrastructure of the RTU HPC (High-Performance Computing) Centre or Scientific Computing Centre (http://hpc.rtu.lv/), including RTU supercomputer and scientific software.
The RTU e-learning environment ORTUS, based on Moodle platform, is used to support the learning process. All resources available in the e-learning environment can be used by the students at their own pace and according to their individual needs. During the experts' visit, it was identified that the Moodle platform is widely used and accepted among the teaching staff and students.
The evidence of well-established, responsive, and high-quality IT support was identified during the meetings with students and teaching staff.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. The analysis is based on SAR (section 3.3, pp. 1089) and meetings with the program team during the visit to RTU on Oct. 24-28, 2022. The SAR explains that "The scientific basis and infrastructure are provided by FCSIT of RTU". Thus is further explained as: "The main infrastructure objects available at FCSIT: The necessary infrastructure for the projects is available at the Information, Communication and Signal Processing Technologies Research Centre of National Significance (ICSPT RCNS):
scientific infrastructure and administrative facilities of the total area of more than 800m2 for research activities, including individual working places for researchers and PhD students equipped with advanced computing stations for parallel computing, meeting rooms equipped with modern presentation and communication devices, equipment/electronic design laboratory. The center supports most research connected to AI, Robotics, Software Engineering.

FCSIT has set ICSPT RCNS as the main scientific infrastructure object, which since its establishment shows good performance in attracting external funding and delivering scientific results. Current FCSIT plan is to ensure full operation of the ICSPT RCNS and expand when relocated to the new building. Dedicated facilities for autonomous robots and drone experiments. RTU High Performance Computing Center is available for researchers.
Series of up-to-date scientific infrastructure: CRT machine, 3D printer, oscilloscopes and other measurement instruments, soldering stations, power suppliers, cameras, embedded devices for R&D, passive and active electronic components, etc.
Electronics prototyping equipment: PCB milling machines, PCB stencil application machine, PCB reflow oven, soldering equipment (including hot air), electronics laboratory equipment, CNC lathe

and milling machines with 5th axis, room for mechanical assembly and repairs (mechanical tools, welding equipment), 1 Gbit LAN in all RTU infrastructure objects, Wi-Fi network."

The available resources, as described in the Self-Assessment Report and partially visited during the on-site evaluation activities ensure that the doctoral students are provided with favorable preconditions for achieving learning and research outcomes.

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit to RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report pp. 1091-1093.
The SAR pp. 1093 mentions that "The total funding of the program reaches about 320 000 EUR/year. The bulk of the funding is for the Latvian language variant. The funding increases gradually though it is still significantly less than the optimal funding which was calculated as EUR 13 388,43 per student for academic year 2020/2021. The minimum number of students in the study program is 20 and at least 8 new students should be admitted every year. The minimum number of students is determined jointly of both delivery forms (Latvian and English) because most of the studies are taking place jointly and scientific work is individual."
The number of students in the study program as well as in the faculty, combined with other funding sources, is sufficient.

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

The university has allocated all needed provisions (scientific, informative, material, technical and financial) to implement the doctoral program efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation.

Strengths:
1. High-quality facilities for implementing the study process, ergonomic and well-equipped laboratories, a well-maintained and easily accessible library.
2. High-quality and responsive IT support.

Weaknesses:
No weaknesses were identified.

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 provisions are sufficiently met to insure the achievement of the learning outcomes

2.4. Teaching Staff

Analysis

2.4.1. The qualification of the teaching staff members involved in the implementation of the study program complies with the all requirements stated in the laws and regulations given by the RTU.
According to SAR 3.4.1., in total 30 staff with PhDs participate in the implementation of the doctoral study program, out of which are: (1) 14 professors; (2) 11 associate professors. They fulfill the requirements of at least five teachers with a Ph.D. degree and with at least three professors approved by the Latvian Council of Science (19 are experts of the Latvian Council of Science, most of them in Engineering and Technology).
Professors are elected based on their scientific and pedagogical qualifications laid down in the laws and regulations.

2.4.2. The RTU and Faculty of Computer Science and Information Technology purposefully take measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation of the study program.
In SAR 3.4.2. it was reported that no changes in the composition of academic staff have taken place during the reporting period, since the study program was started in the last academic year. But this doctoral study program continues the previous Ph.D. studies at the Faculty of Computer Science and Information Technology and the teaching staff composition was refreshed and the average age was lowered from 55.4 to 51.4. with new associate professors elected and the share of associate professors has increased. In 2022, an international competition for the position of a tenured professor in artificial intelligence and cybersecurity has been announced.

2.4.3. The scientific publications and the involvement in research-related projects of the academic staff involved in the implementation of the doctoral study programs contribute to the quality of the doctoral study program but further analysis can be made based on the data related only to the doctoral study program.
It is reported that the academic staff involved in the doctoral study program and the researchers employed by RTU have published an average of 180 publications per year and that the number of papers indexed in Web of Science (WoS) and Scopus has increased significantly, and at the same time the number of non-indexed data has decreased. The number of articles published in journals is increasing because the RTU Strategy is to focus on the development of journal publications.
It would be useful to have data related only to the teaching staff working in this doctoral study program and that in the tables there is the distinction between articles published in journals and conference proceedings. Furthermore, it is not feasible to check, based on the provided data if all members of the teaching staff fulfill standard 2.4.4.
The number of articles published in journals indexed in WoS or Scopus is still rather low (26).
The Faculty also publishes two scientific journals, one of which has been indexed in WoS since 2018, and 43 scientific publications have been published in the journal. But it is important to stimulate the local teaching staff to publish in these journals.
In the SAR it is reported that during the reporting period, academic staff of the doctoral study program and researchers of the FCSIT have participated in the implementation of more than 110 research projects, out of which 63% (74) of the projects are contractual work with the companies. There are 6 FP 7/Horizon 2020 projects and 1 COST, 1 ERA-NET, and 15 national research and science grants and programs. The total funding of scientific projects is increasing, reaching EUR 1,25 mil in 2021.
The academic staff involved in the study program have been involved in the management or implementation of scientific projects and implemented projects cover all research areas of the study program.
It would be purposeful, if only projects in which the academic staff of the doctoral study program participated, are reported.

2.4.4. The increase in relevance of publications, in general, is noticeable. But it is not feasible to check, based on the provided data if all members of the teaching staff fulfill standard 2.4.4. that each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions.

2.4.5. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has not been clearly elaborated in the SAR.
The SAR 3.4.5. stated that the cross-referencing among the study courses have been regularly discussed and that the staff exchanges the experience at the methodological seminars (similar formulations are in SAR for other study programs bachelor and Master). Then the study courses are shortly described to argue that they are mutually complementary.
There was no detail on how the exchange of ideas and research and teaching practices are promoted among academic staff.
Additionally, it was stated that the current student-to-staff ratio is 3, which is in compliance with the average level among the leading universities around the world.

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

The qualification of the teaching staff members involved in the implementation of the study program complies with all requirements stated in the relevant laws and regulations. The RTU and Faculty take measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation of the study program. There are examples of the internationalization of the academic staff. The scientific publications and the involvement in research-related projects of the academic staff contribute to the quality of the doctoral study program but further analysis can be made based on the data on projects and publications related only to the doctoral study program.
The members of the academic staff have published in the last six years in peer-reviewed editions, including international editions, and the increase in relevance of publications, in general, is noticeable. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has been implemented at least on the formal level but it has not been clearly elaborated in the SAR if it reaches beyond formal and usual.

Strengths:
1. The qualification of the teaching staff involved in the implementation of the doctoral study program complies with the requirements defined by Law and The RTU.
2. The composition of the teaching staff is adequate and the average age is lower than several years before with more associate professors.
3. The international competition for one position of a tenured professor is announced.
4. Number and share of articles published in journals referred to in WoS and Scopus have been increasingly showing that the RTU Strategy related to focusing on publishing in recognized journals has been implemented.
5. The academic staff engaged in the study program have been involved in the management or implementation of scientific projects and implemented projects cover all research areas of the study program.
6. The student-to-staff ratio is in compliance with the average level among the leading universities around the world.

Weakness:
1. In SAR there is no mention of any sustainable and comprehensive plan for teaching staff teaching competencies development.
2. The number of articles published in journals indexed in WoS or Scopus is still rather low.

3. From the data presented in the SAR it is not clear if each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions.
4. It would be purposeful, if only projects in which the academic staff of the doctoral study program participated, are reported.
5. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has not been clearly elaborated in the SAR.

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

All the standards have been met. There are no major concerns. Minor concerns are related to planning for teachers' competence development, analysis of research output on the individual level, and clear formulation of the mechanism for teaching staff cooperation

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

NA

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

NA

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 Annex A10_DDC0(51482)_StudyCoursesdescr_ENG.zip provides the required description of all courses of the program both in Latvian and in English. Descriptions comply with regulations set forth in 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 Annex 5.16.pielikums - Diploma paraugi.zip complies with the procedure by which state-recognized documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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 annex Confirmation - on compliance of the academic staff.edoc provides the information that at least five professors and associate professors take part in the implementation of the compulsory part and the limited elective part.

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

Clause has been removed from law as of 14.07.2022.
Still, there are less than 250 full-time students in the program, and the report (A29_3.1.2_DDC0(51482)_ProvisionalTranslationofJustification250stud_eng.pdf) provides confirmation of a relevant opinion of the Council of Higher Education, as well as information that at least five professors and associate professors who take part in the implementation of the compulsory part and the limited elective part.

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

According to the report, the teaching staff consists of 30 staff members with a doctoral degree with 19 of them (annex EDC0(51482)_Apliecinajums_LZPsaraksts_ConfirmationLCSlist_3.4.1_lv_eng.zip) being experts approved by the Latvian Science Council

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

Attached resumes of staff and RTU confirmation DDC0(51482)_Apliecinajums_LZPsaraksts_ConfirmationLCSlist_3.4.1_lv_eng.zip verifies that state language proficiency is compliant with Cabinet Regulation.. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 04000-2.2.1-e/51 verifies that language proficiency in English is at least B2

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

Sample of the attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU study program “Computer Science and Information Technology” (doctoral studies)

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

NA

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

NA

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

All requirements are fulfilled.

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

The program title is compliant with the study field. The program delivers a degree covering and related to the aims, objectives, learning outcomes, and admission requirements (although the

specific ranking criteria for the candidates are not explained). The program received no changes from the last evaluation. The program is fully justified and aligned with the requirements of the global research environment, although its name seems somehow mismatched with the declared goals (the university lists as goals electrical and electronic engineering, mathematics and modeling, and information engineering; no computer science or information technology per se are mentioned).
The content is topical and meets the needs of the industry, labor market, and scientific trends.
The awarding of a degree is based on the achievements and findings of the relevant field of science.
The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. The SAR states that the program is applying student-centered learning and teaching principles.
The students have clearly defined promotion (doctoral thesis defense) opportunities.
The topics of students' final theses are relevant to the field and correspond to the study program.
The qualification of the teaching staff members involved in the implementation of the study program complies with all requirements stated in the relevant laws and regulations.
The RTU and Faculty take measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation of the study program. There are examples of the internationalization of the academic staff.
The scientific publications and the involvement in research-related projects of the academic staff contribute to the quality of the doctoral study program but further analysis can be made based on the data on projects and publications related only to the doctoral study program.
Most members of the academic staff in the last six years have published in peer-reviewed editions, including international editions, and the increase in relevance of publications, in general, is noticeable.
A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has been implemented at least on the formal level but it has not been clearly elaborated in the SAR if it reaches beyond formal and usual.

There are quite a few weaknesses mentioned, but they do not diminish the quality of the program and are meant as tools to make the program exemplary. Some of the weaknesses point out issues with SAR (1, 3, 4, 5). Item 2 is rather research than the program evaluation, i.e. publications are sufficient, but improvement would benefit the program as well. 6 and 7 are mostly discussion questions and issues with SAR.

Strengths:
1. The qualification of the teaching staff involved in the implementation of the doctoral study program complies with the requirements defined by Law and The RTU.
2. The composition of the teaching staff is adequate and the average age is lower than several years before with more associate professors.
3. The international competition for one position of a tenured professor is announced.
4. Number and share of articles published in journals referred to in WoS and Scopus have been increasingly showing that the RTU Strategy related to focusing on publishing in recognized journals has been implemented.
5. The academic staff engaged in the study program have been involved in the management or implementation of scientific projects and implemented projects cover all research areas of the study program.
6. The student-to-staff ratio is in compliance with the average level among the leading universities around the world.
7. High-quality facilities for implementing the study process, ergonomic and well-equipped laboratories, and a well-maintained and easily accessible library.
8. High-quality and responsive IT support.

9. Clear study process and progress requirements.
10. Defined periodic student progress evaluation.
11. Mandatory course delivery in Latvian ensures the development and sustainability of terminology in the Latvian language.
12. Surveys conducted with students.
13. The holders of Ph.D. are 100% employed.

Weakness:
1. In SAR there is no mention of any sustainable and comprehensive plan for teaching staff teaching competencies development.
2. The number of articles published in journals indexed in WoS or Scopus is still rather low.
3. From the data presented in the SAR it is not clear if each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions. However, the table in Section 3.4 indirectly shows, that it is fulfilled.
4. It would be purposeful, if only projects in which the academic staff of the doctoral study program participated, are reported.
5. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has not been clearly elaborated in the SAR.
6. Benefits or reasoning for offering the Ph.D. specifically as a mathematics degree is not clear, especially when all relevant staff and supporting systems are not available within the RTU.
7. There is an apparent mismatch between the name of the study program and the goal and specialization developed within (the “Computer Science” part seems underrepresented, since the university lists as goals electrical and electronic engineering, mathematics and modeling, and information engineering; no computer science or information technology per se are mentioned).
8. There is the need to perform internal assessments on the dynamic of students and prepare corrective actions, as only 25% of the first-year students graduate and the overall number of admission has decreased.

Evaluation of the study programme "Computer Science and Information Technology"

Evaluation of the study programme:

Excellent

2.6. Recommendations for the Study Programme "Computer Science and Information Technology"

Short-term recommendations

1. Formalize lecturers competencies development procedures, including yearly planning and analysis of individual needs.
2. Review the program to change irrelevant courses to courses, which better correspond to the program title and aims.
3. Clarify the distinction between specialization courses and specialized professional electives as well, as the meaning of specializations.
4. Improve the selection and accessibility of elective courses.

Long-term recommendations

1. Prepare plans for teaching staff renewal and assessment.
2. Improve the selection of the specialization courses, and make it broader and more relevant.
3. Review general management specialization, and make it more relevant to the program.

II - "E-LearningTechnology and Management" ASSESSMENT

II - "E-LearningTechnology and Management" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. According to the self-assessment, the program implementers actively follow the development of the priorities and directions of the European Framework Program (EFP) and update the research directions of the doctoral program. There is no clear analysis and assessment of the study program's compliance with the study field in the self-assessment. Generally, the implication of the self-assessment is that the study program also complies with the study field. The title and contents of the study program seem to fit into the study field. The study program has two implementation directions - engineering and social sciences.

2.1.2. The title of the program is "E-Learning Technology and Management". According to the SAR, the goal of the study program is to develop interdisciplinary research in technology and educational sciences, thus developing at the international level research in the field of e-learning. To master existing and create new research methods for e-learning and related areas. To prepare specialists of the highest qualification at the 8th level of the Latvian and European Qualifications Framework for the development of large and complex projects, as well as for work in educational and knowledge support institutions according to the needs of tomorrow's knowledge economy. The outcome of the study program is graduates who are able to create competitive products in knowledge management, mobile and collaboration technologies, e-products, and services. They are able to conduct academic and industrial interdisciplinary research and prepare it for publication in scientific journals. Additionally, they are able to understand the needs of the society in the field of e-learning technologies to choose methods to meet these needs. They will be able to initiate and prepare national and international e-study research and development projects and manage such projects or parts thereof. They will be able to follow the research and development of e-learning technologies in the world, evaluate the latest solutions and predict their impact. They will be able to implement innovative e-learning courses and evaluate the results using the latest e-learning technology findings. Finally, they will be able to create, develop and implement new ideas in the field of e-learning technologies. The degree to be obtained is a Doctor of Science (Ph.D.) in electrical engineering, electronics, information and communication technologies or a Doctor of Science (Ph.D.) in education. The duration of the program is 4 full years and the scope is 192 CPs. The implementation language is both Latvian and English. The title, code, degree to be obtained, aims, objectives, learning outcomes, and admission requirements are interrelated. The duration and scope of the study program implementation, as well as the implementation language, are reasonable and justified. The study language is offered in both Latvian and English which is positive from the international reach view. Since the program is for doctoral studies, it is heavily dependent on the student’s abilities and motivation to succeed in graduation but the courses offered seem to support the process.

2.1.3. The admission requirements have been updated so that eligible students need to have a

degree in one of the following areas: master's degree in natural sciences, master's degree in engineering, master's degree in social science, master's degree in humanities and arts, or higher education diplomas corresponding to the aforementioned master's degrees. The course plan has been changed with changes made to compulsory elective subjects. Part B has the following courses removed: Mobile communication systems, Telecommunications, and computer networks, Signal processing theory, Actualities of information systems development, Structural modeling, Modern methods in computer system design, Distributed intelligent systems, University pedagogy, Psychology of sustainable education, Creating a learning environment conducive to the development of research capabilities, Basic principles of modern education and approaches to their release, Teacher competence, Educational research methodology, Modern management theory, Change theories and contemporaneity, English or German or French. New courses have been added: E-study technologies, E-learning data research and analytics, Data quality: methods, tools, and techniques, Cyber security and e-learning technologies, Pedagogical strategies for personality socialization, Transformative education for self-realization of personality, Quality dimensions of the educational environment, Educational strategies for research skills, Higher education didactics, Pedagogical psychology, Laboratory of ideas: pedagogical solutions for personality socialization, Laboratory of ideas: pedagogical solutions in the context of transformative educations, Management theory. The changes seem quite justified as the program output is a Ph.D. in education and not engineering. New courses have been added from the University of Liepaja for social sciences direction. From the standpoint of cost efficiency considering the number of students in this study program at this study level, this could be a good strategy.

2.1.4. As mentioned in the SAR pp. 866-867, the current social, technological and economical context favors all type of e-activities, especially e-learning: "E-learning technologies have been developing rapidly for more than 20 years. If twenty years ago the transfer of traditional educational methods to the digital environment dominated, now the main challenges are related to the educational models of the digital age. In the last ten years, new educational technologies and new research directions have emerged - MOOCs, learning analytics, artificial intelligence, virtual reality, blockchains. The COVID-19 pandemic gave a rapid impetus to the development of e-learning technologies. At the same time, it should be noted that the decisions on digital solutions in the context of COVID-19 were rapid and political - they were not sufficiently based on the findings of e-learning technology researchers. Researchers are currently working to interpret and generalize the educational experience of COVID-19. Rapid development is expected in the future, as a unified model of education in the digital age is still being developed."
According to the SAR, the graduates are able to establish their own high-tech start-ups, and manage Latvian and European scientific and engineering projects in E-learning technologies both in companies and educational institutions. All graduates are employed as lecturers and researchers at universities (4 from RTU, 2 from LiepU). 8 doctoral students are planning to defend their dissertations in 2022-2023. The average number of students admitted in the reporting period is 2-3. The SAR reports that until now, all doctoral students have graduated who have received ERDF doctoral grant funding for one year.

2.1.5. There is no official joint program at the moment but joint studies with the University of Liepaja have been occurring since 2007. The study program implementers are planning to create an official joint program in 2023.

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

Conclusions
The title and contents of the study program seem to fit into the study field. The study program has

two implementation directions - engineering and social sciences. The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation, as well as the implementation language, are reasonable and justified. The study language is offered in both Latvian and English which is positive from the international reach view. Since the program is for doctoral studies, it is heavily dependent on the student's abilities and motivation to succeed in graduation but the courses offered seem to support the process. The admission requirements have been updated so that eligible students need to have a degree in one of the following areas: master's degree in natural sciences, master's degree in engineering, master's degree in social science, master's degree in humanities and arts, or higher education diplomas corresponding to the aforementioned master's degrees. The current social, technological and economical context favors all type of e-activities, especially e-learning; still the number of students is quite low.

Strengths:
1. The criteria have been met. The strength of the program is that all the students have graduated and have received ERDF funding for one year.

Weaknesses:
1.The number of enrolled students is quite low.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The doctoral study program "E - learning technologies and management" is implemented in the amount of 288 ECTS (192) CP in full-time studies (8 semesters), of which 225 ECTS (150 CP) is the research work and the Ph.D. thesis. 22.5 ECTS (15 CP) are allocated to one field-specific compulsory study course "E-Learning Technology" 22.5 ECTS (15 CP), and with an option to select "Environment and Climate Roadmap" and "Civil Defence" courses, if the student has not mastered the requirements specified in the Environmental Protection Law and the Civil Protection Law in the lower level study. In addition, "Latvian for Foreign Students" is ensured for foreign students studying in English.

31.5 ECTS (21 CP) are allocated for compulsory elective study courses. Compulsory elective study courses are completed in compliance with the Ph.D. Student's needs and the specifics of the Ph.D. thesis topic. Compulsory elective study courses cover sub-fields of field-specific study courses: 1) study courses in engineering sciences; 2) study courses in educational sciences. Thus, specialization in subfields of E-learning technologies is ensured.
9 ECTS (6 CP) are allocated for free elective study courses.
The courses and modules are interconnected and complementary.
Meetings with students did not reveal any evidence of any complaints about the content of the program.

2.2.2. According to the SAR, the examination of e-learning technologies covers the latest knowledge, concepts, and theories in the field of e-learning technology and management. While looking at the branches and sub-sectors of science in the EU classification, it can be inferred that 1)Research in e-learning is part of telematics, which in turn is part of technical sciences; 2) E-content research is part of IT research; 3) Educational multimedia is a research field in the educational sciences.

According to the SAR, the doctoral program in the field of e-learning research develops a holistic

approach both by referring to the latest EU science policy documents and the priorities of the Latvian National Development Plan and by purposefully trying to learn from the mistakes made recently by the world economy (Internet bubble and global crisis).
According to the SAR, the doctoral program develops international research in the field of e-learning. It provides an opportunity to acquire existing and create new research methods for e-learning and related fields. The program prepares highly qualified specialists both for the development of large and complex projects and for work in universities, in accordance with the needs of tomorrow's knowledge economy.
The above-mentioned information and the information gained in interviews confirm that the awarding of the degree is based on the achievements and findings of the relevant field of science.

2.2.3. According to the SAR, studies and research work are carried out according to the doctoral student's individually developed plan, which is approved at the beginning of the studies and is regularly monitored during the studies. The elaboration of a doctoral dissertation is the main work of a doctoral student, where new scientific results must be obtained independently. They must be published and presented in the form of a dissertation. A doctoral dissertation must be prepared for submission to the Promotional Council (Promocijas padome). The main results of the dissertation must be published in appropriate scientific publications and presented at scientific conferences. The development of the dissertation is related to the preparation and submission of appropriate documents. The supervisor accepts the doctoral student's individual plan and advises on the design work, the place of publication, and the choice of conferences. The doctoral student is responsible for drawing up all documents.
The study program is implemented as a joint study program with the University of Liepaja. Based on the information provided in the self-assessment report, no obvious conclusions can be drawn about the added value of the joint study program. However, the impression arises that the University of Liepaja significantly contributes to educational sciences, which historically corresponds to one of the main fields of study of the University of Liepaja.
The interviews did not provide any insight into the student-centered teaching methods implemented to support the learning process. However, formally it is noted in SAR, that the study process is organized according to the principles of student-centered education (https://aic.lv/portal/content/files/Informativs_zinojums_SCL_istenosana_Latvija.pdf).
According to the SAR, the methods used for the study program in English are the same as for the study program in Latvian.

2.2.4. Not applicable

2.2.5. According to SAR, The study program is implemented in close cooperation with the supervisor of the doctoral thesis. In addition, doctoral students are attested at the end of the study year (in accordance with the RTU Doctoral Regulations). The implementation mechanism of this type of study program allows for ensuring the achievement of study results.
Doctoral theses are defended at the RTU “P-21” Promotion Council, which is entitled to award a doctoral degree in Ph.D. in engineering sub-sectors “E-study technologies” and LiepU Promotion Council in the field of educational sciences.
The developed research and defended doctoral theses have a high added value in the development of science and the national economy.

2.2.6. According to the SAR, research themes of the doctoral study program “E-study technologies and management” cover technological solutions of e-learning environment, personalization of e-studies, user interfaces, pedagogical solutions of e-studies, increasing the efficiency of e-studies, e-solutions in society, etc. Meetings with both teaching staff and students provided evidence that the

thesis is closely linked to research activities and topical.

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

Conclusions
The study program covers technological solutions for the e-learning environment, personalization of e-studies, user interfaces, pedagogical solutions for e-studies, and other e-learning-related areas. The program's content is well adapted to achieving its aims, with related and complementary courses and modules. The program is implemented jointly with the University of Liepaja (which has a good specialization in educational sciences).

Strengths:
1. The option to select compulsory elective study courses between two subfields: “Engineering sciences“ and “Educational science”.
2. The courses and modules are interconnected and complementary.

Weaknesses:
1. No apparent conclusions can be drawn about the added value of the joint study program.

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 requirement is met; the obtaining of the PhD degree one uses and develops findings related to technological solutions for the e-learning environment, personalization of e-studies, user interfaces, pedagogical solutions for e-studies, and other e-learning-related areas, all well included in the field of study.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the doctoral study program “E-Learning Technology and Management”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
The program benefits from specific equipment: Video studio and MOOC study materials laboratory (which includes video filming, audio recording, processing, live broadcast organization and interactivity development solutions; Biosignal (EEG) measurement system; Eye tracing measurement equipment; Knowledge perception monitoring technology and IT support.
According to the SAR pp. 882, the doctoral study program “E-Learning Technology and Management” has an equivalent allocation of some 6 state-funded seats per year, with an own budget of some 78k euros/year. This seems to be sufficient for sustaining the number of enrolled students, but not sufficient for the resilient development of the program.

As a part of the IT provision, students will have access to the RTU computer network (access using EDUROAM) with a licensed office, etc. software, including online virtual labs, installed computer programs, and data processing tools. Students will be provided with access to the Moodle (part of the RTU portal ORTUS) e-learning environment, Open-Edx, SAKAI, Open-OLAT, CANVAS, and TELECI e-learning environments and platforms for providing the learning process in the form of distance learning and face-to-face support.
We consider the prerequisites for achieving the learning outcomes and indicate the possibility of ensuring a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. The Self-Assessment Report highlights external cooperations with Vidzeme University of Applied Sciences, University of Liepaja, University Politecnico di Torino, Institut National de Recherche Pour l'Agriculture, L'Alimentation et L'Environnement (INRAE), especially in the organization of joint doctoral schools and invited lecturers.
The Promotion Council includes representatives from the University of Latvia, Rēzekne Academy of Technology, Liepāja University, and Vidzeme University of Applied Sciences.
The available resources, as described in the Self-Assessment Report and partially visited during the on-site evaluation activities ensure that the doctoral students are provided with favorable preconditions for achieving learning and research outcomes.

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the doctoral study program “E-Learning Technology and Management” has an equivalent allocation of some 6 state-funded seats per year, with an own budget of some 78k euros/year. Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is a need of minimum 10 students for a doctoral study program in an order to have financial profitability. The current program has on average 2 students enrolled in the first year (on average over the last 3 years, according to SAR pp. 868-869). This small number of students is clearly non-profitable for the university.

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

Conclusions
The university has allocated all needed provisions (scientific, informative, material, technical and financial) to implement the doctoral program efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development.

Strengths:
1. Very good access to scientific databases and e-learning technologies.
2. Very good international cooperation.

Weaknesses:
1. The number of admitted students is very small and financially non-profitable (the university allocates significantly more student seats than actual students).

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 provisions are sufficiently met to insure the achievement of the learning outcomes

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report and in the Annexes to SAR submitted for evaluation, the teaching staff of the doctoral program “E-Learning Technology and Management” consists of 17 persons: 8 Professors, 2 Assoc. Professors, 7 lecturers, and researchers.
All the teaching staff holds a doctoral degree and 10 are currently listed as experts of the LSC. The study program is implemented for less than 250 students. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

2.4.2. As presented in the Self-Assessment Report, the teaching staff of the doctoral program “E-LearningTechnology and Management” has been significantly changed with respect to the previous evaluation (just one Assoc. Prof is listed in both 2013 and 2022).
As observed in criterion 2.4.1, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure; still, there is no available documentation regarding any specific provision on staff change at the University/ Faculty level.

2.4.3. As presented in the Self-Assessment Report, the teaching staff of the doctoral program “E-Learning Technology and Management” was involved in various positions in more than 20 research projects in the relevant field (the total budget of the contracts is not always disclosed), such as (SAR pp. 891-894):
ERDF project - E-technologies in innovative knowledge source and flow systems; EU 7th Framework Program project - ICT Policy Support Program (ICT PSP). ICT for energy efficiency and sustainability in urban areas; Latvian-Lithuanian Cross-border program project LatLit - Synergetic approach with eLearning, TV, and mobile technologies to promote new business developments; CERN project - Accelerator research and innovation for science and society in Europe (ARIES); ERDF Project - New Algorithms for Interpreting User Behavior for Radical Knowledge Transfer in the Ecosystem; ERA-NET project - FuturICT 2.0 - Large-scale experiments and simulations of the second generation of future ICT.
This research is carried out with the involvement of doctoral students and is reflected in publications, showing that a high-quality doctoral study program is implemented.

2.4.4. As presented in the Self-Assessment Report page 94, “According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]”.
The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean’s management contracts. Academic staff is evaluated based [almost] on the same criteria. As such, as mentioned in the Self-Assessment Report of the program, from the last evaluation in 2013, the teaching staff contributed to some 40 journal and conference papers.
The annual number of publications in journals stands at some 4 publications/year for the whole of the teaching staff (and doctoral students) in the program. The individual annual publication ratio is significantly lower and should be improved, as the ratio of journal publications.

2.4.5. The Self-Assessment Report states that cooperation exists between all stakeholders involved in the study program, which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU (email, chat, and video conference platforms, cloud services, e-learning system), access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 17 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) toward successfully implementing the study program.

Strengths:
1. The teaching staff shows good research results and important involvement in research projects.

Weaknesses:
1. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
2. There are no documented provisions regarding managing the changes in teaching staff.
3. There are no apparent returns (or the SAR does not mention any) in the RTU teaching process from the research results obtained within the doctoral program “E-Learning Technology and Management”.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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: 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

The Annex REDE0_DoktPr_LV_ENG_Diplparaugi.zip provides the required description of all courses of the program both in Latvian and in English. Descriptions comply with regulations set forth in 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 Annex P28_3.1.2_EDC0(51523)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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 annex Confirmation - on compliance of the academic staff.edoc provides the information that at least five professors and associate professors take part in the implementation of the compulsory part and the limited elective part.

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

Clause has been removed from law as of 14.07.2022.

Still, there are less than 250 full-time students in the program, and the report (A29_3.1.2_EDE0(51482)_ProvisionalTranslationofJustification250stud_eng.pdf) provides confirmation of a relevant opinion of the Council of Higher Education, as well as information that at least five professors and associate professors who take part in the implementation of the compulsory part and the limited elective part.

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

According to the report, the teaching staff includes 11 members with doctoral degree (annex EDE0(51482)_Apliecinajums_LZPsaraksts_ConfirmationLCSlist_3.4.1_lv_eng.zip) being experts approved by the Latvian Science Council.

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the state language.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Confirmation - knowledge of the foreign language.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Study_agreements.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU study program “Computer Science and Information Technology” (doctoral studies)

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

RTU confirmation (Confirmation - on compensation for losses.edoc) Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the licence of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

All requirements are fulfilled.

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

The study program complies with the study field. The title, code, degree to be obtained of the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation and the implementation language are sufficiently reasonable and justified. The study program covers technological solutions for the e-learning environment, personalization of e-studies, user interfaces, pedagogical solutions for e-studies, and other e-learning-related areas. The content of the program is well adapted to achieving its aims, with connected and complementary courses and modules. The program is implemented jointly with the University of Liepaja (with a good specialization in educational sciences). The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the doctoral program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.

Strengths:
1. Very good access to scientific databases and e-learning technologies and international cooperation.
2. The teaching staff shows good research results and important involvement in research projects.

Weaknesses:
1. The number of admitted students is very small and financially non-profitable (the university allocates significantly more student seats than actual students).
2. Lack of documentation of the cooperation between the teaching staff and their specific

interactions towards program changes.
3. There are no documented provisions regarding the management of the changes in teaching staff.
4. There are no apparent returns (or the SAR does not mention any) in the RTU teaching process from the research results obtained within the doctoral program “E-Learning Technology and Management”.
5. No obvious conclusions can be drawn about the added value of the joint study program.

Evaluation of the study programme "E-LearningTechnology and Management"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "E-LearningTechnology and Management"

Short-term recommendations

4. Consider the analysis of under-enrolment (below the 10-student limit established by RTU) on the resilience and development of the program with conclusions for corrective measures.
5. Analyze the projected increase of students when reformulating the program as a joint program before developing the joint program.
3. Consider the documented mechanisms of teaching staff cooperation toward program implementation and documented provisions regarding managing the changes in teaching staff.

Long-term recommendations

1. Consider the use of research results within the teaching process developed in the RTU study programs and their e-learning support.

II - "Electronics" ASSESSMENT

II - "Electronics" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Doctoral study program “Electronics” is included in the study field “Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science”. The study program by its parameters, indicators, and content fully complies with the chosen study field.

2.1.2. The study program “Electronics'' is a dotoral study program with the goal of preparing highly qualified specialists in electronics who are able to identify and solve current problems in any field of electronics, thus ensuring the effective development or use of new technologies in the design, implementation, and operation of various electronic systems related to information processing. The degree to be obtained is a Doctor of Science (Ph.D.) in Electrical Engineering, Electronics, Information, and Communication Technologies. The study length is 4 years full-time. Studies are in Latvian and English, however, as of now there are no foreign students in this program. Admission requirements are Masters's degree in Engineering or equivalent. The study program results are as

follows:
“Graduate of the study program:
- is able to independently carry out scientific research and pedagogical work in electronics;
- is able to identify, analyze and offer solutions to current problems in any field of electronics;
- is able to work individually and in a team doing research work;
- manages research methodology and modern research methods;
- is able to formulate and present research results (also in a foreign language);
- is able and willing to improve their knowledge of electronics constantly;
- has defended his dissertation.”
The study program by its title, degree, qualification, and curriculum is consistent with the study field "Information technologies, computer engineering, electronics, telecommunications, computer management, and computer science". The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program.

2.1.3. During the reporting period changes were made to the study program curriculum and courses. In the study parameters few fundamental changes were made - the study program is also implemented in English and until 2020 the conferred degree was the Doctor of Engineering (Dr.Sc.Ing.), and from 2020 it is Doctor of Science (Ph.D.) according to amendments of the Cabinet of Ministers Regulations. All changes are justified and supported.

2.1.4. As of now there are 18 students total in this doctoral study program. Last year (2020/2021) 3 students were enrolled, and the year before (2019/2020) - 3 as well. There are no foreign students. According to RTU 3.1.3. study program graduates are employed at, for example, Riga Technical University, Institute of Electronics and Computer Science, Ventspils International Radioastronomy Centre, SIA "ADI", SIA "HansaMatrix Innovations", AS "SAF Tehnika", SIA "Eventech", etc. Student numbers and dynamics are at a good level and the study program is economically and socially justified as a highly intensive research program.

2.1.5. Not applicable

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

Conclusions
The title, code, degree, and obtainable qualification are interrelated and coherent and fall within the scope of the general aims of the study program and study field.

Strengths:
1. Study program fulfills a valuable research role within the field.

Weaknesses:
none

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The academic volume of the doctoral study program “Electronics” is 288 ECTS (192 CP), of which 225 ECTS (150 CP) is the research work and the Ph.D. thesis. 22.5 ECTS (15 CP) are allocated to three compulsory study courses “Elements of Solid State Electronics”, “Signal Processing Theory” and “Applied Electrodynamics”. All the compulsory study courses studied in the first year improve and strengthen the knowledge in the following subfields: “Electromagnetic Fields and Waves",

Circuits and Signals Fields, and Solid-State Physics. While 31.5 ECTS (21 CP) are allocated for compulsory elective study courses. During the second study year, compulsory elective study courses are completed in compliance with the Ph.D. Student's needs and the specifics of the Ph.D. thesis topic, as well as free elective study courses. This provides in-depth knowledge and improved competencies in the selected subfield of the Ph.D. Thesis topic: “Electromagnetic Fields and Waves” or “Circuits and Signals”. The third and fourth study years are devoted to active research activities, Ph.D. Thesis development, and summaries.
The courses and modules are interconnected and complementary.
Meetings with students did not reveal any evidence of any complaints about the content of the program.

2.2.2. According to SAR, the doctoral study program "Electronics" is the only program in Latvia that prepares highly qualified international-level experts - doctors of sciences in the sub-fields of Electromagnetic Fields and Waves or Circuits and Signals of the field of Electrical Engineering, Electronics, Information and communication technologies, developing the ability to perform high-level fundamental research and to solve high-complexity practical tasks, which are necessary to carry out independent research work and pedagogical work, thereby providing the intellectual potential and renewal necessary for the economic development of the country.
The content of the study program and its implementation are based on the current regulatory legal acts of the Republic of Latvia, the principles of doctoral studies recommended by the European Association of Universities, the EQUAL doctoral guidelines of May 2016, and comply with the goals of strategic development of the RTU and the Faculty of Electronics and Telecommunications and UN Sustainable development goals in higher education. Graduates of the study program receive the degree of the Doctor of Science.
The above-mentioned information and the information gained in interviews confirm that the awarding of the degree is based on the achievements and findings of the relevant field of science.

2.2.3. According to SAR, the doctoral study program “Electronics” is implemented by considering the diversity of students and the diversity of the forms of implementation of studies, applying various teaching methods, and promoting mutual respect and possibilities of providing feedback. In this way, compliance with the principles of student-centered education has complied.

The studies are based on the Ph.D. student's individual work plan, which is developed considering the Ph.D. Student's needs and the specifics of the Ph.D. Thesis topic.
According to the SAR, the teaching methods, the structure of study courses, and the assessment methods are selected by the teaching staff responsible for the study course in compliance with the specifics of the content of the study course and the study program, as well as students' needs. The methods used to implement the courses include lectures, laboratory exercises, practical exercises, study projects, home exercises, independent work, consultations, and testing.

2.2.4. Not applicable

2.2.5. According to SAR, theses are performed during the whole period of Ph.D. studies with the support of the scientific supervisor and the science commission of the faculty. The Ph.D. student presents the progress of the development of the Ph.D. Thesis and summarizes the research results in at least one scientific article every year. During the studies, scientific seminars are organized to present the Ph.D. students' research studies and discuss them. At the end of the fourth study year, the pre-defense of the Ph.D. thesis is organized for the Ph.D. student at the meetings of the council of the Institute of Radioelectronics with the participation of the chair of the promotion council "RTU P-08". The thesis, the envisaged tasks, performed research and attained results are presented. If the

above presentation is positively evaluated, a recommendation is issued to submit the Ph.D. Thesis for review to the promotion council "RTU P-08". Following a positive decision, the promotion council assigns possible reviewers, sets the time and venue of defense, and forwards the submitted Ph.D. Thesis to the State Scientific Qualification Committee.

2.2.6. According to the SAR, the topics of the doctoral theses lie in the fields of “Fields and waves in electronics” and “Circuits and signals”. Meetings with employers and students provided evidence that thesis is closely linked to industry and topical.

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

Conclusions
The content of the study program and its implementation are appropriate and “as expected” for a doctoral program in electronics. The implementation of the studies is conducted in close cooperation with the industry; the topics approached are within the scientific trends. The doctoral study programme offers two sub-programmes as specializations.

Strengths:
1. The content is topical and meets the needs of the industry, labor market, and scientific trends.
2. The option to select compulsory elective study courses between two subfields: “Electromagnetic Fields and Waves“ and “Circuits and Signals”.
3. Close collaboration with industry.

Weaknesses:
none

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 themes approached in the program are relevant and of interest to the scientific field.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. As presented in the Self-Assessment Report, RTU insures all necessary provisions for the good implementation of the doctoral study program “Electronics”. It should be noted the existence of the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is a national library that has obtained this status due to library accreditation and offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes). Also, RTU offers a significant digital infrastructure for all educational activities, including e-learning support, Microsoft Windows and Office lease and Microsoft Azure cloud computing, etc.
Some specialized laboratories and centers mainly sustain the study program: the Wireless sensor network (WSN) and software-defined radio (SDR) laboratory; the Laboratory of electroacoustics; the Prototyping laboratory; the Electronic devices testing center of Latvia (LEITC).
The courses of the doctoral study program are provided by the teaching staff of the Faculty of Electronics and Telecommunications – all holding the title of doctor of science, assigned by the

departments of the FET: Departments of Electronics Basics; Department of Electronic Devices; Department of Radio Devices, Institute of Radioelectronics.
According to the SAR pp. 270, the doctoral study program “Electronics'' has an equivalent allocation of some 6-7 state-funded seats per year, with an own budget of some 80k euros/year. This seems to be sufficient for sustaining the number of enrolled students, but not sufficient for the resilient development of the program, considering that the program specifics involve the use of both hardware and software components (software-defined radio platforms, sensors platforms, radio electronics measurement equipment, etc.) that are subject to technological aging and wear and must be regularly updated.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. The Self-Assessment Report highlights two important external cooperations with the Electronic devices testing center of Latvia (LEITC) and the Ventspils International Radioastronomy Centre. Also, within-RTU (internal) cooperation exists, such as with the Institute of Radioelectronics, the RTU HPC center (Scientific Computing Centre), or the Institute of Electronics and Computer Science (EDI). The available resources, as described in the Self-Assessment Report and partially visited during the on-site evaluation activities ensure that the doctoral students are provided with favorable preconditions for achieving learning and research outcomes.

2.3.3. As presented in the Self-Assessment Report and in discussions with the RTU management and study programs directors, the RTU has a decentralized budget allocated to individual structural units. The head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant structural unit head, and develops a procurement plan for the next year for providing implementation of the study program or courses.
The budget of study programs is funded mainly by the state-funded “student-seat”; their number and the associated funding are subject to state regulations; the doctoral study program “Electronics” has an equivalent allocation of some 6 – 7 state-funded seats per year, with an own budget of some 80k euros/year. Funding obtained in the program is used to cover daily expenses related to the implementation of the study program (for example, premises, utility payments, etc.). After making the mandatory payments, the remaining funding is used for the development of the study program: literature, electronic components, and teaching kits.
Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".
Information on the minimum needed number of students in the program is presented in the annex to the self-assessment report "On the minimal number of students in study programs", according to which there is a need minimum of 10 students for a doctoral study program in an order to have financial profitability. The current program has on average some 3 students enrolled in the first year (on average over the last years, according to SAR pp. 251). This small number of students is clearly non-profitable for the university.

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

Conclusions
The RTU has allocated all needed provisions (scientific, informative, material, technical and financial) such that the doctoral study program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development. It should be noted that the program involves the use of a

special software and hardware infrastructure, which is subject to technological aging and physical wear, and as such, medium-term plans must be implemented to insure the continuous upgrade of the hardware and software platforms.

Strengths:
1. Very good access to scientific databases and e-learning technologies.
2. Very good international cooperation.

Weaknesses:
1. The number of admitted students is very small and most likely financially non-profitable (the university allocates significantly more student seats than actual students).
2. There is no planning of the hardware/software replacement/ upgrade and the associated cost estimates for some financial planning.

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 provisions are sufficiently met to insure the achievement of the learning outcomes.

2.4. Teaching Staff

Analysis

2.4.1. As presented in the Self-Assessment Report and in the Annexes to SAR submitted for evaluation, the teaching staff of the doctoral program “Electronics” consists of 5 persons: 1 Professor, 3 Assoc. Professors, 1 Assistant Professor. All the teaching staff holds a doctoral degree (in Physics or Engineering) and 3 are currently listed as experts of the LSC. The study program is implemented for less than 250 students. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia.
Over the course of the next two years, 60% of the elected positions of the academic staff will expire, as well as 1 of the 3 LCS expert listings. There is the danger that 40% of the academic staff (2 persons out of 5) will retire in the very foreseeable future (since they currently have 71 and 74 years, respectively) - SAR pp. 272 (Table).

2.4.2. As presented in the Self-Assessment Report, the teaching staff of the doctoral program “Electronics” has been 60% changed with respect to the previous evaluation (only 2 out of the 5 persons in the teaching staff were involved in the study program in the previous evaluation - SAR pp. 271-272). The average age of the teaching staff in 2013 was 67 years, in 2022 the average age of the teaching staff is 53 years). As observed in 2.4.1, the current teaching staff fulfills the statutory requirements and has the expected competencies and results (in terms of publications and student enrollment). This shows that the teaching staff composition change was managed successfully by the responsible structure; still, there is no available documentation regarding any specific provision on staff change at the University/ Faculty level.

2.4.3. As presented in the Self-Assessment Report, the teaching staff of the doctoral program “Electronics” was involved since the last evaluation of the study program, under various positions in 23 research projects in the fields of Power engineering, electronics, information, and communication

technologies/ Electronics and telecommunications/ Physics (with a budget of around 2.5Meuros) - such as Progressive wireless energy transmission methods (LCS project), Modulation of picosecond resolution impulse position for communications of unprecedented high energy efficiency (LCS project), Development and testing of the new generation seal repelling devices (Innovation project), etc. as presented in SAR pp. 277-280. This research is carried out with the involvement of doctoral students and is reflected in publications, showing that a high-quality doctoral study program is implemented.

2.4.4. As presented in the Self-Assessment Report pp. 94, "According to the RTU requirements, apart from their involvement in the study process, academic staff should be actively involved in research. Professors and associate professors are re-evaluated and re-elected every six years. Candidates shall meet certain criteria in terms of scientific research […]".
The discussion with the management of RTU (mainly the Vice-Rector in charge of research) emphasized that RTU has developed key performance indicators based on the research (such as the number of citations of the publications) and the achievement of KPIs is part of the dean's management contracts. Academic staff is evaluated based [almost] on the same criteria. As such, as mentioned in the Self-Assessment Report of the program, from the last evaluation in 2013, the teaching staff contributed to 16 peer-reviewed journal papers and a good number of conference papers.
The annual number of publications in journals stands at some 1.5 publications/year for the whole of the teaching staff (and doctoral students) in the program. The publication trend is stationary (SAR pp. 274). The individual annual publication ratio is significantly lower and should be improved.

2.4.5. The Self-Assessment Report states that cooperation does exist between all stakeholders involved in the study program, cooperation which is driving the changes in the study program. The description provided in the Self-Assessment Report is rather technical, mentioning the logistics of communication and cooperation (i.e. IT&C resources provided by RTU - such as email, chat and video conference, cloud, e-learning platforms - access to scientific information, etc.); the discussions with the management of the study field and various study programs, as well as with teaching staff, students and industry representatives confirmed the existence of interactions and cooperation towards the adaptation of the contents of the study program to society and labor market needs, but no clear, documented procedures and proof of their implementation were provided.

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

Conclusions
The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. There are 5 persons in the academic staff allocated to the program. The teaching staff is active in research and cooperates (in non-documented ways) toward successfully implementing the study program.

Strengths:
1. The teaching staff is a balanced mix of very experienced professors (40% of the total number, average age 73 years) and young professors (60% of the total number, average age 39 years).

Weakness:
1. Over the course of the next two years 60% of the elected positions of the academic staff will expire, as well as 1 of the 3 LCS expert listings. The danger is that 40% of the academic staff will retire in the foreseeable future.
2. Lack of documentation of the cooperation between the teaching staff and their specific

interactions towards program changes.
3. There are no documented provisions regarding the management of the changes in teaching staff.
4. The individual annual publication ratio is rather low and non-uniform among the teaching staff.

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

There is a full compliance of the teaching staff with the conditions and requirements of the 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: 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 (PA10_EDJ0(51523)_StudyCoursesdescr_ENG.zip) are prepared in latvian and english. Descriptions complies with regulations set forth in 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 sample (EDJ0_DoktorProgr_LV_ENG.pdf) complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet Regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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

Attached confirmation (Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc) 17.06.2022. Nr. 02000-2.2.1-e/56 and SAR 3.4. indicates compliance with requirements set forth by 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

Clause has been removed from law as of 14.07.2022.

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

Attached confirmation (EDJ0(51523)_Apliecinajums_LZPsaraksts_ConfirmationLCSlist_3.4.1_lv_eng.zip) affirms three involved staff members are LSC experts in Engineering and technology – Electrical engineering, Electronic engineering, Information engineering. Five staff members with a doctoral degrees are involved in the implementation of the study program according to SAR 3.4.1

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

Attached resumes of staff and RTU confirmation letter (Apliecinājums - valsts valodas zināšanas.edoc) Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation . Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter (Apliecinājums - svešvalodu prasme.edoc) Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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 sample of the attached study agreement (Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in the RTU academic bachelor study program “Computer Systems” or in relevant study programs in Latvia University of Life Sciences and Technology by student choice.

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

RTU confirmation (P15_2.1.4_StudijuTurpin_StudyContinue.zip) indicates that students have the opportunity to continue studies in RTU doctoral study program “Telecommunications”.

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 study program fully complies with regulatory enactments.

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

The content of the study program is topical and meets the needs of the industry, labor market, and scientific trends. The university has allocated all needed provisions (scientific, informative, material, technical and financial) such that the doctoral study program can be implemented efficiently and correctly. The funding of the program (as allocated from student grants and paying student taxes) seems to support the program implementation, but the small number of enrolled students represents a threat to financial profitability and program development. The teaching staff provisions are evaluated as conforming to the requirements of the Higher Education Law of Latvia. The study program fully complies with the regulatory enactments.

Strengths:
1. The content is topical and meets the needs of the industry, labor market, and scientific trends; there is a good collaboration with the industry.
2. The teaching staff is a balanced mix of very experienced professors (40% of the total number, average age 73 years) and young professors (60% of the total number, average age 39 years).

Weakness:

1. Over the course of the next two years 60% of the elected positions of the academic staff will expire, as well as 1 of the 3 LCS expert listings. The danger is that 40% of the academic staff will retire in the foreseeable future.
2. Lack of documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
3. There are no documented provisions regarding the management of the changes in teaching staff.

Evaluation of the study programme "Electronics"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Electronics"

Short-term recommendations

1. Consider implementing a consistent plan for the increase in the number of enrolled students.
2. Consider the planning of the hardware/software replacement/ upgrade and include the cost estimates in some financial planning.

Long-term recommendations

1. Consider the documentation of the cooperation between the teaching staff and their specific interactions towards program changes.
2. Consider provisions regarding the inclusion of new teaching staff and the management of the changes in teaching staff, since over the course of the next two years 60% of the elected positions of the academic staff will expire, as well as 1 of the 3 LCS expert listings and there is the danger that 40% of the academic staff will retire in the very foreseeable future.
3. Consider the improvement of the individual annual publication ratio for all teaching staff.

II - "Telecommunications" ASSESSMENT

II - "Telecommunications" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. According to the SAR (pages 725-726), the study program consists of research in all telecommunication fields. The primary objective is to improve the necessary knowledge and skills of students for research in the field of telecommunications and to provide the essential skills for independent research. The study program is implemented by observing the RTU research roadmap and the relevance of creating the scientific and research environment and development. The result of the study program is an independently developed doctoral thesis with substantial theoretical significance and potential for practical use, which includes original scientific research results obtained by independently evaluating and choosing research methodologies and methods appropriate for modern research. The thesis provides new scientific and professional knowledge in the field of telecommunications technology sciences. According to the SAR, the development of the doctoral study program is observing the European Qualifications Framework documents,

correspondence to the Bologna process, and other normative acts. The title and contents of the study program are in compliance with the study field.

2.1.2. According to the SAR (pages 721-723), the title of the study program is "Telecommunications". The code of the program is 51523. The aim of the study program is to prepare specialists of the highest scientific qualification - Doctors of Science, mainly to carry out research and pedagogical work in the field of electrical engineering, electronics, information, and communication technology science. The outcome of the study program is graduates who are able to show and understand current scientific theories in the field of telecommunication technologies. The graduates are able to apply the acquired knowledge in solving scientific problems and are able to independently perform scientific research and pedagogical and organizational work in the field of telecommunications. They are fully aware of the terminology used in the sector and can communicate about the scientific activity in the field of telecommunications. The graduates are able to carry out scientific and industrial research, introduce innovations and manage complex research and development projects. Additionally, they are able to manage and implement the academic process (delivery of study courses, evaluation of study results, development of study course content, and management of study programs). They are able to advance the research ideas in the field of telecommunications, develop, plan, present, implement and manage large-scale international scientific projects in the field of telecommunications. The graduates are able to work independently and in a team to solve scientific problems and are able to independently improve his/her scientific qualification and manage research or development tasks in companies, institutions, and organizations where extensive research knowledge and skills are required. They are able to analyze the latest development trends in telecommunications technologies and improve their knowledge. Finally, they are able to independently plan and conduct research with added scientific value in the field of telecommunications, interpret and analyze the results, and develop high-level scientific publications. The admission requirements declare that to be eligible for enrolment, the student has to possess a master's degree in Engineering Science in Telecommunication Technologies and Networks Management or comparable education. The degree to be acquired is a Doctor of Science (Ph.D.) in Electrical Engineering, Electronics, Information, and Communication Technologies. The title, code, degree to be obtained, aims, objectives, learning outcomes, and admission requirements are interrelated. The duration (4 years) and scope (192 CP) of the study program implementation, with languages both Latvian and English supported, are reasonable and justified. Doctoral studies are primarily conducted in practical classes, where students perform the tasks given by the instructor using mathematical, analytical, and experimental research methods. The doctoral student finishes each study course with a report, which should be submitted to the attestation committee. In the second stage of the study program, scientific research is performed within the framework of an individual Doctoral thesis. The aim of the study program is to prepare specialists of the highest scientific qualification - doctors of science.

2.1.3. According to the SAR (pages 724-725), there have been changes since the previous accreditation of the study field. The study program director has changed. The degree obtained was previously “Doctor of Engineering Sciences” and now the degree is “Doctor of Sciences” (Ph.D.), due to amendments in the Regulations of the Cabinet of Ministers of the Republic of Latvia. New courses have been included in the compulsory elective specialization part for the “Computer Engineering and Networks” and “Electronic Communications” specialization. The following study courses are included in the compulsory elective professional specialization part. In the specialization "Computer Engineering and Networks": RDE717 Hybrid Optical Fibre-Wireless Communication and Networking (4 CP), RAE713 Management of Telecommunications Projects (4 CP), RAE714 Telecommunications Network Management (6 CP). In the specialization "Electronic Communications": RDE714 Quantum Communication (6 CP), RDE715 Metaphotonics in Telecommunications (4 CP), RDE716 Microwave

Photonics Devices and Systems (6 CP), RDE718 Basics of Integrated Photonics (4 CP). These changes help modernize the study program and increase its competitiveness. The changes are justified and reasonable and would be supported by the expert team.

2.1.4. According to the SAR (pages 727-728), indicators of the telecommunications field are increasing and synergy between telecommunications and economics and other economic fields is of increasing importance. The study program prepares experts which are necessary to perform independent scientific research and pedagogical work. The average number of doctoral students in the study program is 29 per year. Each year on average 7 students are enrolled. The number of students enrolled in the 1st year is stable with a slightly positive trend. The average number of defended doctoral theses is 2 theses per study year. According to the self-assessment report, the number of students who exmatriculated from the studies does not exceed the 10% limit of the total number of students. The most commonly reported reasons for terminating studies are family circumstances and difficulties combining studies with work because some doctoral students work outside the RTU.

2.1.5. Not applicable

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

Conclusions
The study program complies with the study field.
The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation and the implementation language are sufficiently reasonable and justified.
The corrections made to the study program's parameters within the assessment of the study field are sufficiently analyzed, and justified and would be supported.
The economic and social justification of the study program, dynamics of the number of students, and employment indicators of the study program graduates are sufficiently reasonable.

Strengths:
1. Stable admission of new students can be considered a strength.
2. Multiple changes in the study program supported by previous analysis can also be considered a strength.

Weaknesses:
1. The low number of defended theses per year compared to new students admitted can be considered a weakness and needs to be addressed more (i.e., student retention). The recommendation is to implement more support systems for the students and if necessary, add more monitoring systems to detect if students are experiencing difficulties (i.e., early warning systems).

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 730-732) and the Annexes to it, and in the interviews conducted during the visit as well. The aim of the program is to prepare specialists of the highest scientific qualification - Doctors of Science, capable of carrying out research and pedagogical work in the field of electrical engineering, electronics, information, and communication technology. The program is focused on interdisciplinary research in Mathematics, Physics, Electronics, Photonics, Metamaterials, Quantum, Microwave

Communications, and Fiber Optics.
The volume of the program is 192 CP; 150 CP corresponds to scientific work, where the major part is elaboration and defense of the Doctoral thesis. Choice, volume, and content of courses of the program are composed so that the doctoral students can study telecommunication technologies and the newest trends of creation and management principles thereof and create their own research work on the basis of the implementation of new ideas.
The basis of the studies is the individual work plan of a doctoral student, which is created taking into account all needs of the doctoral student and the specifics of the Doctoral thesis. When choosing courses, a sample of planning is used, but a student may create an individual plan, taking into account the relation of the courses. Students have wide opportunities to independently plan the progress of studies in the compulsory course “Scientific seminars”, where the students create and reconcile the planned scientific seminar activities in the Science Committee of FET.
Courses and scientific research are offered in various subfields of telecommunication engineering, including digital signal processing and coding, digital communications, signal modulation, and coding, quantum communications, microwave photonics, microphotonics, integrated photonics, metaphotonics, hybrid optical fiber-wireless communications, high-density optical and fiber optical networks, communication network design and optimization, wireless communications, sensors, etc.
The main research directions of the program are:
● Data transmission systems (fiber optics, wireless, and quantum) and functional elements thereof.
● Metaphotonics solutions in optical communications and sensor technologies.
The majority of these research directions are developed within the framework of local and international scientific projects.

2.2.2
The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 732-734) and the Annexes to it, and in the interviews conducted during the visit as well. The program finishes by defending the Doctoral thesis (dissertation) in front of the RTU P-08 Promotion Council. The prepared Doctoral thesis is submitted to the Promotion Council, which submits the report for assessment to the State Scientific Qualification Committee, and after receiving positive opinion, appoints opponents and organizes the public defense. The degree is awarded if the Council members' secret ballot is positive.
The doctoral scientific degree is awarded for an independently developed and defended doctoral thesis or a similar thematically unified set of scientific publications that contain scientifically original, proven results and provide new insights in the field of telecommunications technologies.

2.2.3 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 734-737) and the Annexes to it, and in the interviews conducted during the visit as well. The objectives set out in the descriptions of study courses are closely connected to the standard achievable results of the study program. The course contents lead to the achievement of the anticipated study results. Verification and improvement of the study course content are performed regularly; this helps control and renew the content of studies and teaching methods and keeps the achievable results up-to-date.
Different teaching methods and forms (lectures, practical and laboratory work, seminars, study work, and pedagogical practice) are used in the learning process, the choice of which is related to the specifics of each course. Much attention is devoted to the analysis and compilation of scientific literature, scientific articles, and conference materials, as well as independent work in laboratories and with computer equipment and computer modeling. Active teaching methods are widely used in the classes - discussion of problems in a group, discussions, presentations with reports on the results of scientific work, etc. Students' independent studies play an important role. The description of their progress is included in the description of each course as a mandatory component. The

student's ability to learn independently is purposefully developed in all courses and in the framework of scientific work as well. At the end of each semester, the students prepare a report on the work done in each course they took, as well as on their scientific research work.
Different students, their knowledge, skills, and experience, and the variety of needs of doctoral students are taken into account and observed, thus applying individual learning schedules for each. Various types of course content implementation in the program are included. The teaching staff works with students in small groups or individually, allowing the use of various pedagogical learning and teaching methods. The study process is organized in such a way that promotes the independence of doctoral students while providing supervision and support from the teaching staff acting as scientific advisors or mentors. Besides, it promotes mutual respect and facilitates the growth of all parties involved in the study process.
Achievement of the planned learning outcomes of the course “Scientific seminars” are planned by the doctoral student together with the Doctoral thesis advisor and are reconciled in the Science Committee of FET. Achievements within the courses are registered in the work plan implementation section, and implementation thereof is approved by the Science Committee of FET. The planned volume of work may be implemented during several semesters.

2.2.4 Not applicable

2.2.5 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 737-738) and the Annexes to it, and in the interviews conducted during the visit as well. Elaboration of the Doctoral thesis is controlled at two levels:
● regular meetings with the Doctoral thesis advisor;
● reports at the structural unit institute council meeting (first-year students at least twice per semester, students of other years - at least once per semester).
Doctoral students are transferred to the next study year by order of the Faculty dean, on the basis of the decision of the Faculty Science Committee and observing such minimal requirements in preparation and elaboration of the Doctoral thesis:
1. For the doctoral student in the first year:
● One scientific article is published or accepted for publishing.
2. For the doctoral student in the second year:
● One scientific article is published.
● One scientific article is published or accepted for publishing in a journal.
● The Doctoral thesis is ready by 30% of the total volume of the paper.
3. For the doctoral student in the third year:
● One scientific article is published.
● One scientific article is published in a journal.
● The Doctoral thesis is ready by 75% of the total volume of the paper.
The doctoral degree applicant must have at least five publications in an anonymously peer-reviewed scientific publication indexed in the Web of Science or SCOPUS databases, or included in the INT1 or INT2 category journals of the ERIH (European Reference Index of the Humanities) database. Modern data analysis, data processing methods, as well as experimental work in the laboratory are used in doctoral work. The research results must have been approved at international scientific conferences (seminars).
The RTU “P-08” Promotion Council, has the right to award a scientific degree of doctor of science (Ph.D.) in the field of Electric equipment, Electronics, Information and Communication Technologies, in the subfields “Computer Engineering and Networks” and “Electronic Communications”.

2.2.6 The analysis herein is based on the information provided in the Self Assessment Report (SAR) pp. 739-740) and the Annexes to it, and in the interviews conducted during the visit as well. The

doctoral thesis topic (field of research) of each student is chosen when applying for admission. At the same time, the program director recommends a potential scientific advisor for the dissertation and consultants. When commencing the doctoral studies, for each doctoral student, by order of the RTU vice-rector for science, a Doctoral thesis advisor, supported by the Doctoral studies department, is approved. The topic of the Doctoral thesis is finalized not long before the defense of the Doctoral thesis.
The graduates of the program have performed research in the RTU FET IT research directions (a) Data transmission systems (fiber optics, wireless, and quantum) and functional elements thereof; and (b) Metaphotonics solutions in optical communications and sensor technologies.
According to the SAR, the topics of the doctoral theses lie in the fields of digital signal processing, digital communications, signal modulation and coding, quantum communications and networking, microwave photonics, integrated photonics, metaphotonics, hybrid optical fiber-wireless communications, high-density optical and fiber optical networks, communication network design and optimization, wireless communications, sensors, etc.

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

Conclusions
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The awarding of a degree is based on the achievements and findings of the relevant field of science. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered and employed. The topics of students' Ph.D. theses are relevant to the field and correspond to the study program. The students have clearly defined promotion (doctoral thesis defense) opportunities.

Strengths:
1. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
2. The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
3. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
4. The teaching and learning methods employed are student-centered.
5. The topics of the Ph.D. thesis are relevant to the program.

Weaknesses:
none

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

All criteria are satisfied.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU ensures all necessary provisions for the good implementation of the study program.
RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka) is an accredited national library. It offers mostly digital access to a wide range of scientific databases (Scopus, SpringerLink, ScienceDirect, IEEE Xplore, etc. according to (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes).
The program uses FET labs, such as Electrical Measurements Laboratory, Transmission Systems, and Access Networks Laboratory, Telecommunications Theory Measurement Laboratory, Digital Devices, and Systems Laboratory, Digital Electronics and Computer Architecture Laboratory, Transmission Media Laboratory, Transport Network Performance Assessment, and Radio Navigation, Transport Electronics Laboratory and other laboratories.
According to SAR (section 3.3.3) the program is funded by the state. The funding is growing, i. e. in 2013/2014 it was 61 636 Euro, and in 2020/2021 it reached 270 489 Eur. The funding is sufficient to support the program. Moreover, it is growing.
We consider the prerequisites for the achievement of the learning outcomes and indicate the possibility to ensure a high-quality study process has been created and can be maintained during the following accreditation period.

2.3.2. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022. The program is well supported by different research projects and active international cooperation:
1. Experiments of the program Ph.D. students are performed at the Photonics Institute of the Technical University of Denmark, Aveiro University (Portugal), the Royal Institute of Technology (Sweden), Interuniversity Microelectronics Centre (IMEC), the University of Latvia, etc.
2. Cooperation with some universities continues at the postdoc level, e.g. Eindhoven Technical University, RISE (Research Institute of Sweden), JKU Institute of Applied Statistics (Austria)
However, some cooperation with industry would be very beneficial for the students as well, at least to learn about the commercialization of their research, and today’s industry's needs.

2.3.3. The analysis is based on SAR (section 3.3) and meetings with the program team during the visit at RTU on Oct. 24-28, 2022.
RTU has a decentralized budget allocated to structural units. Salaries and basic procurement are planned by the unit, while university-wide infrastructure is procured at the whole RTU level. Funding rules are defined in the legal acts and RTU regulations, with details provided in the self-evaluation report. The number of students in the program as well as in the faculty, combined with other funding sources, is sufficient.

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

Conclusions
The program is well-founded, funding is increasing, and international cooperation is growing as well. However, more cooperation with industry and specific knowledge of commercialization would be beneficial for the students.

Strengths

1. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
2. Good international cooperation
3. Increasing funding.

Weaknesses
1. Insufficient industrial cooperation.
2. Students of this program do not have access to EDUROAM, in contrast to all other students of the RTU.
3. Student of this program do not have access to the most computational resources, which other students have.

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 provisions are sufficiently met to insure the achievement of the learning outcomes. However, some industrial cooperation would be beneficial for the program as well.

2.4. Teaching Staff

Analysis

2.4.1. The qualification of the teaching staff complies with the legal requirements and provides bases for the achievement of the aims and learning outcomes of the study program.
The implementation Doctoral study program “Telecommunications” was licensed at the end of 2000 and its volume is 288 ECTS (4-year duration) implementation of the study program is provided by the academic staff of RTU FET Institute of Telecommunications
The qualification of the teaching staff members involved in the implementation of the study program complies with the requirements stated by the relevant laws.
In the SAR it is stated that the choice of the academic staff is related to their experience in scientific activities and taking into account the specifics of the study program and the study courses.
According to SAR 3.4.1., eight representatives of the academic staff involved in the study program have expert rights of the Latvian Council of Science (LZP). All members of the teaching staff have doctor’s degrees, and all Doctoral thesis advisers have LZP expert rights.
12 academics with Ph.D. have been introduced in more detail in the SAR but only one of them is a woman. A more gender-balanced approach to teaching staff would be beneficial for the quality of the study program, equity principal, and attract female students.

2.4.2. The RTU FET Institute of Telecommunications purposefully takes measures so that changes in the composition of the teaching staff do not negatively affect the quality of the implementation
As presented in SAR 3.4.2., within the review period 2013 - 2021, the academic staff list of the doctoral study program significantly changed due to retirements, 13 new members of the academic staff are employed and others have been promoted. This considerably decreases the average age of the academic staff of the study program.
The ESF project SAM has been used to attract new staff and advance the competencies of existing ones (e.g. English language courses).

2.4.3. The scientific publications and the involvement in research-related projects of the academic staff are considerable and may contribute to the implementation of a high-quality doctoral study program “Telecommunications.”
As reported in SAR 3.4.3, in the period 2014-2022, there are more than 500 publications of the teaching staff of the RTU doctoral study program published and indexed in SCOPUS. Over that period the number of publications increased until 2017 (the pick) and then decreased.
But the SAR reported that more publications are published in scientific journals and are more significant in volume than conference publications, but any quantitative evidence did not support it.
These publications of the teaching staff of the doctoral study program are cited more than 3600 times (7 citations for one publication on average).
In the SAR it is reported that all teaching staff take part in or conduct various types of international, local, scientific, and research projects (e.g. ERDF, FLPP) and also participate in international ERASMUS+ projects. Many graduation papers are written within the framework of projects and about the project's scientific activity and results.

2.4.4. According to SAR 3.4.3. (pp. 755-756), each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions.
In the SAR (pp. 756-774) aggregated data are presented as well as a list of publications from 2014 till 2022 sorted by year of publication (not by authors).
A list of publications has been supplied in the SAR, but it would be more effective to analyze the fulfillment of the criteria per individual teaching staff in the SAR.

2.4.5. A mechanism for mutual cooperation of the teaching staff in the implementation of the study program has been established, as described in SAR. It is stated in the SAR, 3.4.5. pp. 784 mutual cooperation takes place within a semester, when conducting study courses, and also when planning changes in the study program and preparing development plans for the semester and the program. Additionally, there are regular meetings of the teaching staff, where experience exchange takes place in relation to results of scientific work, updates in the research, and the topic of the study courses, especially when improvements to the study program have been made. Students’ perspective has also been taken into consideration.
The overall assessment of the aims of the study program shows their achievement, implying that teaching staff cooperation works. However, there is no proper documentation regarding the mutual cooperation of the staff.
The student and teaching-staff ratio is 3, corresponding to the average level of leading world universities.

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

Conclusions
Academic staff composition fulfilled regulatory requirements. There is gender inequality strongly in favor of male professors.
Measures have been taken to ensure a stable academic staff body.
The scientific output of academic staff is considerable and multidisciplinary research projects can contribute to the quality of the doctoral study.
Each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions.
Mutual cooperation of academic staff has been promoted.

Strengths:
1. The choice of the academic staff is related to their experience in scientific activities and taking

into account the specifics of the study program and the study courses
2. The study program attracts new academic staff and their average age of them is decreased.
3. The number of publications indexed in Scopus has been increasing until 2017.
4. The average citation per article is solid and more publications have been published in journals.
5. Research projects are from different fields related to the study program
6. Possibility for mutual learning and cooperation of teaching staff

Weaknesses:
1. The number of publications indexed in Scopus has been decreasing since 2017. and reasons for that should be analyzed. A list of publications to check the fulfillment of the criteria per individual teaching staff is not available in the SAR and therefore it is not clear who is over-performing and who is underperforming.
2. More gender-balanced approach to teaching staff would be beneficial for the quality of the study program, and equity and attract female students.

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

All standards are met and no major weakness has been found. Minor weaknesses are related to further analysis of publication performance on an individual level that can reveal areas of improvement as well as paying attention to gender balance.

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

The Annex P10_EDC0(51523)_StudijuKursuapraksti_LV.zip provides the required description of all courses of the program both in Latvian and in English. Descriptions comply with regulations set forth in 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 Annex P28_3.1.2_EDC0(51523)_DiplPielik_LV_DiplSupplemt_ENG.zip complies with the procedure by which state-recognised documents of higher education are issued according to Cabinet regulation No. 202 “Kārtība, kādā izsniedz valsts atzītus augstāko izglītību apliecinošus dokumentus”

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 annex Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc provides the information that at least five professors and associate professors take part in the implementation of the compulsory part and the limited elective part.

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

Clause has been removed from law as of 14.07.2022.
Still, here are less than 250 full-time students in the program, and the report (Nr_39_RTU_doktora_250_stud_Telekomunik.edoc) provides confirmation of a relevant opinion of the Council of Higher Education, as well as information that at least five professors and associate professors who take part in the implementation of the compulsory part and the limited elective part.

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

According to the report, the teaching staff consists of 13 members with a doctoral degree with 8 of them (annex EDC0(51523)_Apliecinajums_LZPsaraksts_ConfirmationLCSlist_3.4.1_lv_eng.zip) being experts approved by the Latvian Science Council

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

Attached resumes of staff and RTU confirmation Apliecinājums - valsts valodas zināšanas.edoc letter Nr. 02000-2.2.1-e/54 verifies that state language proficiency is compliant with Cabinet Regulation.. Nr. 733 "Noteikumi par valsts valodas zināšanu apjomu, valsts valodas prasmes pārbaudes kārtību un valsts nodevu par valsts valodas prasmes pārbaudi"

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

Attached resumes of staff and RTU confirmation letter Apliecinājums - svešvalodu prasme.edoc Nr. 02000-2.2.1-e/55 verifies that language proficiency in English is at least B2.

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

Sample of attached study agreement (annex Studiju_ligumi.zip) complies with Cabinet Regulation. Nr. 70 "Studiju līgumā obligāti 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 annex (P15_2.1.4_StudijuTurpin_StudyContinue.zip) provides information that the student can continue studies in RTU professional doctoral study program "Electronics"

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

RTU confirmation Apliecinājums - par zaudējumu kompensāciju.edoc Nr. 01000-2.2.1-e/157 states, that students are guaranteed compensation for losses if the study program is not accredited or the license of the study program is revoked due to the actions of the college (actions or failure to act) and the student does not wish to continue the 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

All the requirements are satisfied

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

The study program complies with the study field.

The title, code, degree to be obtained from the study program, aims, objectives, learning outcomes, and admission requirements are sufficiently interrelated. The duration and scope of the study program implementation and the implementation language are sufficiently reasonable and justified.
The corrections made to the study program's parameters within the assessment of the study field are sufficiently analyzed, and justified and would be supported.
The economic and social justification of the study program, dynamics of the number of students, and employment indicators of the study program graduates are sufficiently reasonable.
The content of the study program is topical. The courses are interconnected and complementary, they correspond to the objectives of the program and they ensure the achievement of learning outcomes. The study program meets the needs of the industry and the labor market in terms of technical/scientific knowledge and skills. The study program complies with pertinent national regulations (state education standards). The awarding of a degree is based on the achievements and findings of the relevant field of science. The study implementation methods contribute to the achievement of the aims and learning outcomes of the study courses and the study program. Student-centered learning and teaching principles are considered and employed. The topics of students' Ph.D. theses are relevant to the field and correspond to the study program. The students have clearly defined promotion (doctoral thesis defense) opportunities.
The program is well-founded, funding is increasing, and international cooperation is growing as well. However, more cooperation with industry and specific knowledge of commercialization would be beneficial for the students.
Academic staff composition fulfilled regulatory requirements. There is gender inequality strongly in favor of male professors.
Measures have been taken to ensure a stable academic staff body.
The scientific output of academic staff is considerable and multidisciplinary research projects can contribute to the quality of the doctoral study.
Each member of the academic staff in the last six years has published in peer-reviewed editions, including international editions.
Mutual cooperation of academic staff has been promoted.

Strengths:
1. The choice of the academic staff is related to their experience in scientific activities and taking into account the specifics of the study program and the study courses
2. The study program attracts new academic staff and their average age of them is decreased.
3. The number of publications indexed in Scopus has been increasing until 2017.
4. The average citation per article is solid and more publications have been published in journals.
5. Research projects are from different fields related to the study program
6. Possibility for mutual learning and cooperation of teaching staff
7. Good provision of the program - new or renovated buildings, well-equipped laboratories, and a library.
8. Good international cooperation
9. Increasing funding.
10. The program is topical and its constituent courses are interconnected and complementary, with some expected, and needed, overlap.
11 The overall program is designed so as to lead to the achievement of its objectives and of the stated learning outcomes.
12. The program meets the needs of the industry and the labor market in terms of technical knowledge and skills.
13. The teaching and learning methods employed are student-centered.
14. The topics of the Ph.D. thesis are relevant to the program.
15. Stable admission of new students can be considered a strength.

16. Multiple changes in the study program supported by previous analysis can also be considered a strength.

Weaknesses:
1. The number of publications indexed in Scopus has been decreasing since 2017. and reasons for that should be analyzed. A list of publications to check the fulfillment of the criteria per individual teaching staff is not available in the SAR and therefore it is not clear who is over-performing and who is underperforming.
2. More gender-balanced approach to teaching staff would be beneficial for the quality of the study program, and equity and attract female students.
3. Insufficient industrial cooperation.
4. The low number of defended theses per year compared to new students admitted can be considered a weakness and needs to be addressed more (i.e., student retention). The recommendation is to implement more support systems for the students and if necessary, add more monitoring systems to detect if students are experiencing difficulties (i.e., early warning systems).

Evaluation of the study programme "Telecommunications"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Telecommunications"

Short-term recommendations

1. The number of publications indexed in Scopus has been decreasing since 2017. and reasons for that should be analyzed. A list of publications to check the fulfillment of the criteria per individual teaching staff is not available in the SAR and therefore it is not clear who is over-performing and who is underperforming. This analysis can serve as a basis for personal development plans for teaching staff.
2. Consider the analysis of the gender composition of teaching staff in order to check if the equity approach has been implemented and women teachers supported in their careers.
3. Ensure access for the students of this particular program to EDUROAM.
4. Ensure access for the students of the program access to the same resources as all RTU students.

Long-term recommendations

1. Establish some industrial cooperation.
2. Implement more support systems for the students and if necessary, add more monitoring systems to detect if students are experiencing difficulties (i.e., early warning systems).

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			RTU ensures the continuous improvement and development of the study field.
R2 - Compliance of scientific research and artistic creation with the level of development of scientific research and artistic creation (if applicable)	Fully compliant			All criteria (1.4.1 to 1.4.6) are met based on the information provided by the HEI.
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			All standards are fulfilled. The implemented cooperation mechanisms, although general, can deliver significant results in the aims of the study field
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 RTU has seriously considered the past recommendations and has taken concrete action toward implementing them. Even if not all have been implemented, the University has laid out a track for doing so in a set time horizon. Some of the recommendations that have been formally implemented have not been sufficiently effective in resolving the underlying weakness and/or in completely removing its root causes.

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)
1	Finance Management Information Systems (42484)	Not relevant	Fully compliant	Fully compliant	Partially compliant	Good
2	Transport Electronics and Telematics (42523)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
3	Smart Electronic Systems (42523)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
4	Computer Systems (42526)	Not relevant	Fully compliant	Fully compliant	Partially compliant	Good
5	Computer Science and Organizational Technologies (43483)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Average
6	Computer Systems (43526)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
7	Information Technology (43526)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
8	Intelligent Robotic Systems (43526)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
9	Telecommunication Technologies and Data Transmission Engineering (43526)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
10	Smart Computer Technologies (43526)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Good
11	Business Informatics (45526)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
12	Computer Systems (45526)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good

No.	Study programme	R5	R6	R7	R8	Evaluation of the study programme (excellent, good, average, poor)
13	Digital Humanities (45526)	Partially compliant	Fully compliant	Fully compliant	Fully compliant	Average
14	Information Technology (45526)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
15	Intelligent Robotic Systems (45526)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
16	Cybersecurity Engineering (45526)	Partially compliant	Fully compliant	Partially compliant	Fully compliant	Average
17	Logistics and Supply Chain Management (45526)	Fully compliant	Fully compliant	Partially compliant	Fully compliant	Good
18	Telecommunication Technologies and Networks Management (45526)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
19	Information Technology Project management (47483)	Partially compliant	Fully compliant	Fully compliant	Partially compliant	Average
20	Transport Electronics and Telematics (47523)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
21	Smart Electronic Systems (47523)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
22	Computer Systems (47526)	Fully compliant	Fully compliant	Fully compliant	Partially compliant	Good
23	Computer Science and Information Technology (51482)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Excellent

No.	Study programme	R5	R6	R7	R8	Evaluation of the study programme (excellent, good, average, poor)
24	E-LearningTechnology and Management (51482)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
25	Electronics (51523)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
26	Telecommunications (51523)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good

The Dissenting Opinions of the Experts

1. Cybersecurity engineering evaluation is between Poor and Average, the program needs improvements. Evaluations by the experts:
Average – 4 experts;
Poor – 1 experts.

2. Transport Electronics and Telematics programs (both, Bachelor and Master) are evaluated as:
Good by 3 experts;
Poor by 1 expert.

3. Computer Science and Organizational Technologies:
Poor - 1 expert;
Average - 4 experts.

4. Digital humanities – overall Poor:
Poor by 2 experts;
Good by 2 expert;
Average by 1 expert.