Expert group joint opinion

Evaluation Procedure: Assessment of Study Field

Higher Education Institution: Riga Technical University

Study field: Physics, Material Science, Mathematics, and Statistics

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

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The Physics, Material Science, Mathematics, and Statistics study field at Riga Technical university (RTU) entails two bachelor's and two master's study programmes as well as one doctoral programme. The Study field has an important place in the RTU development strategy.

RTU has established a quality policy and is in the continuous process of developing a quality assurance system that contributes to the achievement of the aims and learning outcomes of the study programmes in the study field. The system requires continuous improvement - experts have provided analysis and recommendations for improvement further in this report.

RTU collects and analyzes vast amounts of quantitative data through frequent surveys, and the data are used later for taking decisions on the necessary changes to improve the Study field. One part missing from the surveying process is feedback to the involved parties and stakeholders.

The students and the teaching staff have access to the necessary resources (including laboratories and specific laboratory equipment) to ensure the quality of the teaching and learning process.

It was noted that there is no motivational system in place for the academic staff to be involved in science and the publication of scientific articles. There is a need to increase international mobility activities and raise the number of high-quality publications.

The study field has established strong cooperation with various stakeholders however mechanisms should be implemented to involve more industry partners.

During the visit, experts learned that students and graduates are satisfied with their studies experience and with the quality of the knowledge and skills obtained. The study process is based on practical examples and thus the students are well prepared for working in the industry.

The content of the Doctoral study programme should be revised and PhD level for all study courses should be ensured by either improving course content or by replacing study courses.

It was noted that there is no master's programme in the study field, which allows a seamless transition to the doctoral programme.

There was a recommendation from the previous experts regarding the quality of study course descriptions with respect to recommended literature, which was not taken into account and currently still needs improvement.

The academic staff, administration students and graduates demonstrate loyalty to RTU.

From the employer's perspective, there is a lack of professional graduates in the particular study field. Graduates from the RTU and particular study field are highly appreciated. However, document analysis and the interviews conducted by experts during the visit revealed two aspects that should be considered on an institutional level:

- Marketing activities should be improved in order to reach more potential students, especially from abroad.
- Distance learning programmes should be considered especially in Financial Engineering and Financial Engineering Mathematics programmes.

Both activities can bear a positive impact on the number of students in the programmes.

I - Assessment of the Study Field

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1.1 Management of the Study Field

Analysis

1.1.1. Study field "Physics, Material Science, Mathematics and Statistics" is an important part of Riga Technical university's study fields portfolio. The study field generates specialists in a variety of

areas, such as financial statistics, insurance, physics, material science, etc.
One of the most important ways to assess the development of a study field and its management of it is to assess study field compliance with development needs and development trends of the society and the national economy, labor market needs and trends, and employment of graduates.
It was recognized that RTU is an example of ensuring a real link between studies and the real labor market. During the visit (Meeting with the HEI management, employers, students, and graduates) it was noticeable that RTU keeps the study field up to date with the latest trends in the market, technologies, science, and research. It was noted that students almost definitely find their jobs in corresponding areas of expertise already during their studies.
In the survey conducted by the Employer's Confederation of Latvia (LDDK) RTU was recognized as an institution that is most recommended and acknowledged by employers and it is in the honorable 1st place in this rating every year, which speaks clearly about quality of study process and necessity for prepared specialists.
RTU intention within the study field is to prepare internationally acknowledged, highly qualified specialists in different fields of physics, material science, and statistics. University has defined objectives and learning outcomes of the study field provided in the Self-evaluation report chapter 2.1.1.
The objective of the academic bachelor's study program "Materials Engineering" is to provide students with theoretical basic knowledge of material sciences, independent acquisition of professional work skills, and basic research in design, production, quality assessment of materials, and other related areas, as well as to prepare students for further master studies or obtaining higher professional qualification ().
The objective of the academic master's study program "Material Science and Nanotechnologies" is to prepare systemically and engineering-minded and capable specialists for independent creative work in the fields of materials design, development and design of technological processes for manufacturing materials, testing, and quality assurance of materials, certification, and marketing of materials, nanomaterials, and nanotechnologies, including inorganic, organic and polymeric nanomaterials, nano biomaterials, who know nanomaterials extraction technologies and their exploration in scientific research, as well as for creative scientific activities and further doctoral studies.
The objective of the professional bachelor's study program "Financial Engineering" is to prepare internationally competitive and dynamic professionals meeting the requirements of the national economy, who use the latest developments in information technology (IT) to carry out work related to the management of financial operations, to analyze business processes; to analyze, model and forecast financial flows; to optimize securities portfolios and investments using IT; to identify problems, to formulate objectives, to predict ways to achieve them and implement them.
The objective of the academic master's study program "Financial Engineering Mathematics" is to provide deep knowledge in the fields of mathematics, financial and actuarial technologies, with a view to providing higher level technical education for graduates of the study program who will work in the financial sector, including work in the analytical departments of credit institutions, financial consulting companies, financial management, and financial advisory companies, insurance companies and companies engaged in investment in financial markets, as well as to continue education by increasing professional competence, doctoral studies.
The objective of the doctoral study program "Particle Physics and Accelerator Technologies" is to ensure the possibility of performing doctoral studies and obtaining a doctoral degree in high energy physics and accelerator technologies in Latvia.
It is clear that RTU meets defined objectives and learning outcomes, based on available information and received information during the visit. It is confirmed that the content and implementation of the study programs in the field are steadily reviewed, analyzed, and improved based on the opinions of students and graduates, as well as the recommendations of industry specialists.

RTU has developed a system for the admission of students. Admission rules are in accordance with the law and are approved accordingly.
The structure of the management (administration) of the study field and the relevant study programs are adequate and oriented towards the development of the study field and reaching defined study goals. Decision-making is efficient. The support provided by the administrative and technical staff contributes to the meeting of all needs of the study field and relevant programs.
RTU-developed academic principles of integrity are clear, especially regarding plagiarism. As confirmed by interviewed persons, plagiarism is uncommon and even unimaginable.
It was noted that RTU struggles to attract a sufficient number of students. During interviews, it was found, that in some cases students and graduates found their way to the study field occasionally. It was also noted that there is not enough information about the study field and programs available publicly for persons, who are not familiar with RTU and do not visit the university's website.
1.1.2. RTU has identified and analyzed the strengths, weaknesses, opportunities, and threats of the study field.
Strengths in SWOT analysis are adequately identified.
Different levels of initial preparedness of the students were identified as a weakness. To remedy the situation RTU has introduced additional courses for the applicants of bachelor studies, to gain the necessary knowledge for the successful study process. It was noted from the discussions with graduates that it might be even more important to organize such courses also for master study applicants.
Also, the high workload of academic staff in research and sometimes insufficient funding from the state was identified as a weakness. On the other hand, during interviews with management and academic staff, it was mentioned that the state budget for teaching activities makes up only 22% of the budget of RTU. For academic staff, salary related to teaching activities can be estimated as 10% of the total salary, while the rest is coming from research. Therefore, one can consider the current situation as a strength since RTU is not so dependent on the state budget and also academic staff can be employed otherwise in case of changes in the study field. This situation also kind of take care of the identified threat - the lack of a sustainable development strategy in Latvian higher education policy.
The insufficiently developed international brand of RTU was considered a weakness. During the visit, it was noted that there is a lack of marketing activities especially related to the Study field. There are activities related to RTU in general, however detailed information about the Study field is missing. The same could be said about Latvia's marketing activities as well. In experts' opinion marketing activities must be considerably improved both locally and internationally.
The interest in participating in the study field development by entrepreneurs and professionals was recognized as an opportunity, however, there is a lack of information, on how they can become a part of the Study field and programs.
RTU has identified and analyzed the strengths, weaknesses, opportunities, and threats of the study field and integrated them into a development planning document - Development plan 2022 - 2027.
1.1.3. RTU describes the management structure of the study field and the corresponding study programs in section 2.1.3. of Self-evaluation report.
The study field has 5 study programs in total: An academic master study program "Financial Engineering Mathematic", a Professional bachelor study program "Financial Engineering", an Academic master study program "Material Science and Nanotechnologies", Academic bachelor study program "Materials Engineering" and Doctoral study program "Particle Physics and Accelerator Technologies". The Study field Committee includes directors of all study programs, leading teaching staff, representatives of employers, and a representative of students.
The management structure is represented in the annex "RTU Study Field Management Structure" and is adequate. Also, experts in the respective field scientific disciplines, and industry specialists are included in the management structure.

It is indicated that once per academic year annotations of study program study courses and study course programs, methodological materials, the latest study literature, and methodological instructions for study papers (reports, study papers, practice reports, and final papers) are reviewed. The academic staff and the administration of the study program participate in various experience exchange events, cooperating with universities of other countries, and meeting with representatives of relevant institutions and entrepreneurs. The administrative and technical staff ensures all the needs of the study programs corresponding to the study field.

1.1.4. A system has been set up and procedures developed for the admission of students, for the recognition of the study period, professional experience, prior formal and non-formal education, and for the assessment of students' achievements and learning outcomes, they are logical and effective and in accordance with the law, the involved stakeholders are informed about the system. All the requirements are set in corresponding documents approved by the corresponding body of RTU.

Requirements to enroll in study programs in the study field are logical and sufficient (For example ADMISSION REGULATIONS FOR ACADEMIC AND PROFESSIONAL UNDERGRADUATE STUDY PROGRAMS IN the ACADEMIC YEAR 2022/2023; ADMISSION REGULATIONS FOR ACADEMIC AND PROFESSIONAL GRADUATE STUDY PROGRAMS IN the ACADEMIC YEAR 2022/2023; ADMISSION REQUIREMENTS FOR DOCTORAL STUDY PROGRAMS IN the ACADEMIC YEAR 2022/2023; etc.).

RTU Admission Regulations are published online and are available to any interested party.

In order to participate in the competition for the state budget-funded seats in bachelor programs, the rating in Mathematics CE is calculated as the average value of all Mathematics CE rating sections and must be at least 15 percent. An applicant with a CE in mathematics of less than 15 percent may apply only for a tuition fee-based place. Since the minimum passing rating for Mathematics CE is 5 percent, this means that not every applicant is able to become a student.

It is worth mentioning that RTU provides additional courses including mathematics for first-year students in order to catch up with the study pace. This is not a common practice, therefore for RTU as a technology and science-tended university it can be considered as a big advantage for the students.

During interviews with students and graduates, it was mentioned that additional lectures for mathematics during first year of bachelor's studies were very helpful. Also, it was stated that similar lectures on mathematics might be even more helpful during the first year of Master studies.

1.1.5. Riga Technical university has developed an internal document for the Assessment of Learning Outcomes. The document is publicly available (https://www.rtu.lv/writable/public_files/RTU_regulation_on_the_assessment_of_learning_outcomes.pdf). Each course contains a study course description, which includes parts related to skills, knowledge, and competencies gained during the course, and how they will be achieved and how corresponding credit points will be awarded.

During students’ interviews, it was established that at the beginning of each course the corresponding professor describes how the study process will be organized, what assignments there will be, and how students will be evaluated. According to interviewed students, almost for each assignment they know, what the professor expects from them and how delivered results will be evaluated.

Also, it was mentioned during interviews, that it can be for some study courses, in case a student was extremely successful during the semester, the professor can skip the exam for the particular student and give the student a good final grade for the course.

Students are surveyed twice per semester on the quality of study courses, therefore there is a chance to correct the study process, if necessary (REGULATION ON THE STUDENT SURVEYS USED IN ASSESSMENT OF THE EDUCATIONAL PROCESS, Article 3.2.). From the students' interviews, it was understood that there were some cases when the study process was corrected, however overall satisfaction with the study process is high.

1.1.6. RTU collects graduation papers in the ORTUS portal, therefore creating a database that is

used for the automatic control system to detect plagiarism. RTU has also implemented the Turnitin system to minimize any chances of plagiarism. By interviewing the students and graduates, it was noted that there is a well-established culture of academic integrity, which is also reflected in internal documentation (Riga Technical University Code of Academic Integrity).
Students are aware of plagiarism and respect established rules of academic integrity. According to the students' and graduates' opinions, it is well explained and also clear that academic work must be respected, and honest work should be encouraged. Stakeholders are aware of the code of academic integrity and respect it as well as the good reputation of RTU.

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

RTU has a well-designed system in terms of structure as well as management of the study field. Study field is aligned with the RTU strategy. The aims of the study field are clearly defined and attainable. The study field and the relevant study programmes comply with the main fields of the strategic development of the higher education institution and meet the needs and the development trends of the society and national economy.
RTU has identified and analyzed the strengths, weaknesses, opportunities and threats of the study field and integrated them into a development planning document - Development plan 2022 - 2027.
The management structure of the study field and the corresponding study programmes is oriented towards the development of the study field, decision-making takes place efficiently, the support provided by the administrative and technical staff ensures all the needs of the study programmes corresponding to the study field.
A system has been set up and procedures developed for the admission of students, for the recognition of the study period, professional experience, prior formal and non-formal education and for the assessment of students' achievements and learning outcomes. They are logical and effective. The involved stakeholders are informed about the system.
Methods, principles and procedures for assessing the achievements of students have been developed and are clearly defined (REGULATION ON THE ASSESSMENT OF LEARNING OUTCOMES). The relevance of assessment methods and procedures for achieving the aims of study programmes and the needs of students is analyzed annually during reviewing procedure of study courses and also by taking into account survey results.
The university has established the principles of academic integrity and mechanisms (Riga Technical University Code of Academic Integrity, chapter on general principles) for their observation using effective anti-plagiarism tools (Turnitin and Joint computerized plagiarism control system (JCPCS)) that promote the development of the internal culture in the university. The stakeholders involved in Study field development are informed about it.

Strengths
1. University is well recognized and appreciated between students and employers.
2. Adequate management procedures.
3. Employers are involved in the development of study field.
4. RTU has a realistic approach for identifying strengths, weaknesses, opportunities and threats.
5. RTU has enough resources to provide all necessary equipment, academic staff and support for the study field and its programmes. Management structure is well established and fulfills its duties excellently. There is also a quality insurance system present, including annual check of study programmes and courses.
6. Students' admission process is logical, effective, legal and all stakeholders are informed about it. It is good that the requirements for Mathematics are set higher than the requested minimum for Mathematics CE, since this ensures overall higher knowledge of mathematics and makes the study process more homogenous.

7. RTU offers additional lectures in mathematics for the first-year bachelor students, that help students to catch up the level of mathematics in the study courses.
8. It is highly valuable that there are evaluation methods of the study process quality during the semester, which gives opportunity for some corrections.
9. There is an informal problem-solving environment established in RTU, where the students can reach out directly to the RTU academic staff in case of questions or any problems.
10. RTU has well-established and respected academic integrity culture.

Weaknesses
1. There is not enough information available for potential students (social networks), where this information can reach them.
2. There is no master programme in the study field, which allows graduates seamlessly to become students of PhD programme
3. Development plan 2022 - 2027 is lacking more detailed information on specific actions, time schedules and responsible persons.
4. Although members from the industry are represented in the management structure of the study field and its programmes, it is not clear how one can become industry representative in the RTU management structure and contribute to the development of the study field.
5. Quality checks of study courses must be more thorough. There are study courses, where obligatory literature is dated more than 10 years back (for instance study course DIM212 contains obligatory literature dated from 1988 till 2009). Also, some literature is provided in Russian language (for instance study course HEP015 contains reference to the book Хоровиц П, Хилл У .Искусство схемотехники: - М.: Мир, 1993, 704 с). Although expert team agrees that in specific areas well known books that are dated many years back may be considered as essential in the field, most of the literature used in modern study courses must be at least from the last five years.
6. Although there are possibilities for academic staff mobility, they are not used. It was pointed out by academic staff during the visit, that the workload is so high, that sometimes there is no time for mobility. It is also noted that it is free will of academic staff to organize their workload in RTU, so it is the choice of particular academic staff itself to use mobility opportunities or not.
7. Setting up higher minimum requirements for admission can lead to lower numbers of students. However, it is reasonable to do that to ensure that study quality increases because academic staff can move faster to the new subjects and do not need to repeat topics covered in secondary education schools. To minimize student's dropout rate, it might be considered to increase requested knowledge level for potential students even more, which is already in process according to management of RTU.
8. It might be helpful to introduce similar additional courses in mathematics and might be in other subjects for the first-year master students. It might be even more helpful since the background education of students in a master programme can be very different.

1.2. Efficiency of the Internal Quality Assurance System

Analysis

1.2.1. The RTU has established a quality policy that is publicly available to all stakeholders (https://www.rtu.lv/en/university/strategy/rtu-excellence-approach). There are also several internal documents developed that regulate internal processes, quality assurance, and development of the study field (for instance Quality Policy of Riga Technical University, Regulation on the Assessment of Learning Outcomes, Regulation of the Committee of Study Direction, etc.). RTU also recently implemented the EFQM Excellence model, to ensure continuous improvement (https://www.rtu.lv/en/university/strategy/rtu-excellence-approach).
There is also a well-established structure of management and well-defined responsibilities of

involved parties.
Students' and other stakeholders' opinions are monitored through several surveys which are performed regularly. Surveys of the quality of study courses are carried out two times per semester, in this way ensuring the possibility to adjust study processes during the study process.
A complete list of surveys and additional information on surveys can be found in REGULATION ON THE STUDENT SURVEYS USED IN ASSESSMENT OF THE EDUCATIONAL PROCESS.
During interviews with the students, it was established that for students it is possible to avoid participation in surveys, despite them being mandatory. It seems that it is a common process to avoid participation in surveys if a student feels so.
It is established that RTU in general does not analyze students' performance during the study process. It might be possible that there are cases when for students it is too easy to complete a particular study course, which can be detected if grades in a particular course are too high.
It is also noted that there are lacking requirements for study course materials in the ORTUS system. During interviews, it was found that academic staff sometimes do not know that they are required to put materials in ORTUS and don't do that. Others mentioned that there was an e-mail reminding them to update information in ORTUS, without any specific details.
1.2.2. RTU has developed procedures for study program development and revision process (for instance Procedure for Application, Development, and Amendment of the Study Programs, Uniform Requirements of RTU Towards Study Programs, etc). There are indicated involved persons and their responsibilities (starting from the top management and including all stakeholders, students, and graduates). Processes are legal, efficient, and available to stakeholders. Opinions of students and graduates are considered through surveys. It is confirmed by management that the results of the surveys are taken into account when deciding on the development of a study field or programs in it. Information from surveys is used also to evaluate single courses and academic staff. Also, opinions from the industry are taken into account by interviewing corresponding persons and involving them in the development process of the programs.
During an expert visit, it was noted that feedback to students, employers, and graduates is nonexistent. Some students stated that they heard from next year's students that due to the results of the survey some actions were taken to improve the study process, however, they did not receive any feedback from RTU themself. Graduates and employers cannot remember to receive any information from RTU about survey results whatsoever.
Experts have gotten the impression that only a limited number of industry partners are involved in the development of study programs. There is no established procedure, on how companies can contribute to the development of study programs. Communication and cooperation happen only with a close loop of known companies. If a new company arrives without prior connections to RTU, then most likely information from the company will travel from department to department and might not take any noticeable effect.
1.2.3. There is a developed mechanism for the submission of student complaints and suggestions (2.2.3. SAR, p.39). The mechanism of dealing with submitted complaints and suggestions is adequate. Procedure for Submission and Examination of RTU Students’ Proposals and Complaints is available online (https://www.rtu.lv/writable/public_files/RTU_proposals_complaints.pdf).
During interviews with students, it was established that informal methods of dealing with issues are very common among students. Students are encouraged by academic staff and also by each other to deal with issues by speaking with particular academic staff directly. Also, academic staff confirmed that it is common practice. In such a way, problems are solved much more quicker and easier.
Despite the students' confirmation that they are well-informed about official procedures, they prefer to deal with issues informally.
1.2.4. RTU has established data collection mechanisms that are efficient, and ensure regular collection and analysis of obtained statistical data. All interviewed stakeholders confirmed

participation in different kinds of surveys. RTU management confirmed that data are collected and processed in order to ensure constant improvement and development of study programs and the study field in general.
However, it was also indicated by students that although surveys are mandatory, they have the option to skip them so there can be a tendency, that only in case of great or bad study experience students tend to complete surveys.
Also, it was pointed out by participants of surveys, that they do not receive any kind of feedback about survey results.
There is only a small number of industry companies involved in the development of study programs. There is no working mechanism to inform and involve a broader spectrum of companies in the future development of programs.
1.2.5. The information published on the website of the RTU about the study programs corresponding to the study field corresponds to the information available in the official registers (VIIS and E-platform), provides applicants and students with important information that is published in all languages of implementation of the study program.
However, regarding the professional bachelor study program "Financial Engineering", the profession standard has changed and there is no legal right to issue a diploma in this study program with the qualification “Financial analyst”. It was proposed to issue diplomas with the qualification “Financial statistician”, however, there is no corresponding standard, which allows issuing diplomas with such a qualification.
During a discussion with the corresponding program director, it was agreed that the proposed qualification will be changed to “Senior data analysis specialist” with a specialization “Financial statistician”, according to the corresponding profession standard (https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-224.pdf).
During the interviews with students, it was established that there is no overall understanding in society of the term “Material sciences”, which is quite essential for this field of study in particular. Interviewed students are quite happy with the study choice, however, there was an opinion that sometimes potential students choose a study program by accident and only during the study process realize what the study program is about. It seems that society well understands what Physics is, and is Chemistry, but Material sciences are a little bit in the gray area.
Also, there is a lack of information available to potential students on more convenient platforms for them, such as social networks. Undoubtedly there is quite full information available on RTU websites, however, this information does not find its way to potential students.
It was mentioned that RTU participates in international events to popularize studies at the university, but this particular study field is somehow not highlighted among other study programs of RTU and so it gets lost, especially considering the problem with understanding the term “Material sciences” described above.

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

Riga Technical university has established a quality policy (which is publicly available). RTU has developed and maintains a quality assurance system, which contributes to the achievement of the aims and learning outcomes of the study field and the relevant study programmes. The system ensures continuous improvement, development, and efficient performance of the study field and the relevant study programmes.
The procedures for the development and review of the relevant study programmes of the study field and the feedback mechanisms have been defined and they are logical, efficient, and available for all stakeholders. However actual feedback to students, employers, and graduates are almost nonexistent.
The mechanism developed for submission of student complaints and suggestions is effective,

promotes the implementation of improvements, students are informed about such opportunities and receive feedback.
The statistical data collection mechanism established by the RTU is efficient, ensures regular collection and analysis of information (statistics) on the study programmes corresponding to the study field. The mechanism for obtaining feedback, including from students, graduates and employers, is effective and focused on the improvement of the study field. However, in practice feedback to persons who participated in surveys are not provided.
The information published on the website of the higher education institution about the study programmes corresponding to the study field corresponds to the information available in the official registers (VIIS and E-platform), provides applicants and students with important information that is published in all languages of implementation of the study programme.

Strengths
1. RTU has a well-established internal quality system, including all the necessary documentation and processes.
2. Procedures are well developed, they are logical, efficient, and available for all stakeholders.
3. RTU arranges surveys, collects data and takes informative decisions on development of study programmes.
4. Students have opportunity to deal with issues informally, which proves to be more efficient way of solving problems
5. RTU has a well implemented survey system, which is effective, ensures regular collection and analysis of information and is helpful to ensure that programmes and study field in general are in high quality and are constantly improved.
6. On the website or RTU is available detailed and well-structured information about study programmes.

Weaknesses
1. Students can avoid participation in surveys, therefore results sometimes can be misleading.
2. Academic staff sometimes avoid using the ORTUS system and do not upload study materials there.
3. There are no detailed requirements for the materials on the ORTUS system.
4. There is missing actual feedback to the participants of surveys.
5. There is only a small number of industry companies involved in development of study programmes. There is no working mechanism to inform and involve a broader spectrum of companies into future development of programmes.
6. Since most problems are dealt with informally, management might miss information on the actual amount of issues being dealt with during the study process.
7. Information about study programmes are not reaching potential students well enough, especially international students
8. There is a lack of general understanding of the term “Material sciences” in society, which leads to not realizing what the study field and programmes are about.

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 ensure continuous improvement, development, and efficient performance of the study field

whilst implementing its internal quality assurance system

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

Assessment of compliance: Fully compliant

The RTU has established a policy and procedures for assuring the quality of higher education.

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

A mechanism for the development and internal approval of the study programmes, as well as the supervision of their performance and periodic inspection thereof has been developed.

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 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.

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 assuring the qualifications of the academic staff and the work quality have been developed.

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

RTU 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 university.
System is there and information is gathered and processed. On the other hand, students can skip survey and therefore it is not complete since some or many students do not participate. So Experts indicated this as a weakness. In Experts opinion there is no contradiction.

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

RTU ensures continuous improvement, development, and efficient performance of the study field whilst implementing its quality assurance systems.

1.3. Resources and Provision of the Study Field

Analysis

1.3.1. Study field-based funding every academic year is distributed in accordance with the decision of RTU Senate “Methodology for the distribution and use of funding for the structural units of RTU in an academic year”. The Methodology is reviewed and revised every year and is subjected to any necessary changes. RTU has a decentralized budget, therefore each organizational unit is allocated a separate budget. The funding for each organizational unit consists of:

• Basic budget funding;

• Tuition fee funding (training of tuition fee-paying students, including funding paid by students for settling academic arrears);

• Performance funding (research support funding);

• Research base funding (research support funding);

• Tuition fee funding from foreign students.

The funding for the study field (SF) base is acquired from the Ministry of Education and Science and calculated depending on each study program’s (SP) allocated budget placed funded by the government. The expense of one study place is calculated by state-defined basic expenses and study cost coefficients in the thematic areas of education. (SAR pt.2.3.1.)

Values of study cost coefficients are 1.5 times higher for Master study programs and 3 times higher for Doctoral programs than the study cost coefficients specified in Appendix 1 to the Regulations for the respective thematic area of education. (Cabinet Regulations (CB) “Procedure for Financing Higher Education Institutions and Colleges from the State Budget”)

The SP is also financed by local fee-paying students and foreign fee-paying students. Tuition received from local students is distributed in accordance with “Methodology for the distribution and use of funding for the structural units of RTU in an academic year”, however, the tuition from foreign students is allocated in accordance to "Methodology for Allocation of Funds for Study Process Provision at the International Cooperation and Foreign Students Department''.

Research base funding (base funding provided by the state) is allocated among faculties according to the performance-based output indicators, i.e., a number of publications (weighted by impact and citation), funds attracted by research projects and industry contracts, and defended Doctoral. The calculation is based on “Methodology for Allocation of Research Base Funding to RTU Organizational Units”). Allocation of the budget within faculty and its institutes is made within the faculty itself.

RTU has three projects with internal funding: support for publication activities of young scientists; for projects where RTU cooperates with industry partners to promote inter-faculty and interdisciplinary research; for graduates to be involved in the research process. During the assessment meeting, the experts were informed that in 2021/2022 acad. year 99 RTU doctoral students received a doctoral research grant. There is also an Internal Research Excellence Grant for young scientists. This provides funding, which allows the establishment of new research groups in a prospective research field.

During the assessment visit, the experts confirmed in the meeting with the director of the study field and academic staff, that there are sufficient possibilities to acquire funding for research both in the university and in outer competitions (such as Fundamental and Applied Research Projects, etc.).

Organizational units’ directors are provided with access to operational financial information on the unit’s budget, including the envisaged workload and correspondingly allocated funding for the implementation of SP and study courses (SC). The Director of the organizational unit plans the work of the unit at the beginning of each budget year and follows its execution. (SAR pt. 2.3.1.)

Finances for this SF are mainly made up of government funds. During the reporting period, the amount of funding for the SF showed an upward trend, which is related to both the increase in general funding and the opening of a new SP. (SAR pt. 2.3.1.) The experts believe that the finances of the field are balanced.

There are some specific funding issues in some of the SP that will be discussed in the relevant

sections of the assessment of those SP. There are some negative student dropout tendencies that might cause the unprofitability of the SP.
1.3.2. Mainly the study process is organized at RTU campus Ķīpsala. There are currently 54 classrooms, 187 laboratories, 19 special training rooms, 10 computer classrooms, 12 workshops, and several research centers of national importance. The campus also houses a hostel with 950 beds and a special area for people with disabilities. There is available Wifi in all the premises. Every year funds are invested in the repair of study and research laboratories and the improvement of their equipment. (SAR pt. 2.3.2.)
During the assessment visit, the students and graduates brought up that one disadvantage was the old building (Meža street), however with the new faculty building this issue is no longer actual and they are very pleased with the infrastructure.
There is a large variety of equipment available for the practical part of the study process and research. Part of the equipment is included in the UseScience online database (https://scientificservices.eu/) for wider access. In the meeting with academic staff and students, the experts confirmed that the available equipment is easily accessible and sufficient for the study field.
The new equipment and materials are bought within the finances provided for the organizational units, as well as with the funding of research grants and other funding. (SAR pt. 2.3.2.) During the meeting with students, it was also mentioned that there is help from the industry if there is any need to use their equipment or materials. The academic staff helps to find the needed resources.
1.3.3. The Scientific library of RTU is located within the campus and also has 4 branches outside of Rīga. The library holds more than 1.3 million printed documents and e-resources in RTU industry-specific databases. The library offers a guide, which includes websites of various Latvian and foreign publishing houses and bookstores for searching publications and e-resources. There are 713 working places, four rooms for group work and six individual booths, a rare book reading room, and a conference room. The library is equipped with self-service facilities. The facilities are accessible to users with disabilities. (SAR pt. 2.3.3.)
The library subscribes to a variety of databases (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi), the most appropriate for the field being:
• E-books: Proquest Central Academic Complete, eBook Academic Collection EBSCOhost, SpringerLink, eBook Open Access Collection EBSCOhost, ScienceDirect handbooks (Elsevier).
• E-journals: Academic Search Complete EBSCOhost, Wiley Online Library, Applied Science & Technology Source EBSCOhost, ScienceDirect Freedom Collection (Elsevier), IEEE Xplore Digital Library, Business Source Ultimate EBSCOhost, MasterFile Premier EBSCOhost.
The Library Council decides on replenishing the library collection with printed publications and subscribing to the necessary databases. The Compilation Policy of RTU Scientific library Collection regulates the basic principles of the collection development in accordance with the areas of RTU academic and research activities. The library has a common budget that is later calculated for each study program. The collection is replenished taking into account the recommendations of the directors of the study programs and researchers within the calculated funding. Academic and research staff can make recommendations by filling out an order form (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3), calling or visiting the library. (SAR pt. 2.3.3.)
During the assessment period, at the request of the academic staff of the study field:
• “Physics, material science, mathematics and statistics” - 106 books were purchased amounting to 9023,18 EUR;
• “Material nanotechnologies” - 11 books were purchased amounting to 1597,54 EUR;
• “Financial Engineering” - 62 books were purchased amounting to 4180,46 EUR;
• “Material Sciences” - 33 books were purchased amounting to 3245,18 EUR. (SAR pt. 2.3.3.)
In the meetings with students and graduates, it was made clear that there are enough resources, all the needed resources are easily accessible and can be found either online in the databases or at the

library.
1.3.4. Each IT user (students, academics, research staff, etc.) has a unique electronic identity that is valid in all information systems. All 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 access to the directory of all IT services. Users also have access to the Microsoft Office 365 cloud computing platform with 1TB of storage space available to each user and access to a variety of additional collaboration and productivity tools (Microsoft Teams, SharePoint Online, Forms, OneNote, OneDrive, Outlook, etc.). RTU students, academics, and general staff have access to the University's email system.
The Centralized Study Management System is used for the administration of the study process, which ensures the digital provision of the study life cycle, drawing up learning agreements and enrolment of students in SP, registration of SC, designing student's individual study plans, drawing up orders, implementing study courses and study process, registering grades, recognizing study courses, awarding qualifications, administering payments, hostel information, gathering information to issue diploma supplements, etc.
Moodle e-learning system is used, where all relevant information is compiled in an automated way (SC, users, groups, access rights, etc.). The academic staff members place various electronic materials, assessment tests, homework assignments, information on a particular study course, etc. in the system. Students can also view their financial information on the ORTUS portal, as well as make requests for documents (references, transcripts of records, copies of a learning agreement, etc.). For online distance learning RTU academic staff has options to use Zoom or Microsoft Teams video conferencing platforms (SAR pt. 2.3.4.). During meetings with academic staff, it was stated that all the materials for studies (lectures, slides, etc.) have to be placed in Moodle for students and it is checked by the faculty, however not all staff members are following these recommendations.
The Information Systems Security Policy regulates the security of RTU information systems by establishing and maintaining a sufficient set of measures to reduce or prevent potential or resulting harm (SAR pt. 2.3.4).
1.3.5. Elections of RTU academic staff are held in accordance with the requirements of the Law on Higher Education Institutions and Cabinet regulations and in accordance with the Constitution of RTU and the regulations approved by the Senate "On the Procedure of Electing Professors and Associate Professors" and "On the Procedure of Electing Assistant Professors, Lecturers and Assistants", as well as in compliance with other internal laws and regulations. Regarding academic positions for professors and associate professors, where the term of election expires in the respective academic year, periodic evaluation of scientific and pedagogical qualifications is performed in accordance with the "Procedure for Election of a Candidate for the Position of Professor or Associate Professor" and the "Procedure for Assessing the Qualification of an Existing Professor or Associate Professor". (https://www.rtu.lv/lv/universitate/vakances-rtu/personalatlases-dokumenti)
The Personnel Department informs the head of the structural unit about the academic staff and the need to organize the evaluation. The evaluation is performed by the Board of professors of the field in accordance with the Law on Higher Education Institutions, the Regulations of Councils of RTU professors, and the Regulations. After the evaluation, the Council of the professors of the field submits an opinion on the result of the evaluation to the Rector and the Personnel Department. Taking into account the evaluation and the procedures and criteria set by the higher education institution, the employment contract with the associate professor or professor may be extended. If the criteria are not met, then the contract is terminated, and the vacancy is announced. The Personnel Department announces a competition for academic staff positions on RTU website, the Euraxess vacancy portal, and at least in one mass medium distributed throughout Latvia. (SAR pt. 2.3.5.)
During the assessment visit, stakeholders were asked about the possibility to be attracted as new academic staff. Many of interviewed employers were already involved in the study process due to

providing practical placement spots for the students or due to participation in some of the SC with a lecture. Some graduates were involved as academic staff while continuing their studies at the next study level. Students were involved more through research projects or assistants in the laboratories. The experts believe that RTU is open to attracting new teachers from the industry and stakeholders are informed about these possibilities.

1.3.6. The Center for Academic Excellence supports RTU academic staff in the areas of pedagogical, intercultural communication, and self-development. The main tasks of the center:

• to organize various educational events; to coordinate experience exchange activities within faculties and other organizational units;

• to inform the academic staff about the latest teaching and learning trends that are appropriate for RTU;

• to provide guidance to academic staff on the use of teaching and learning methods, as well as on the assessment of student's knowledge, skills, and competence;

• to inform students about learning opportunities.

Every semester, activities are offered to take into account the professional competence and needs of the academic staff, which are identified through a survey, in which the lecturers indicate the most important topics and areas in which they want to improve themselves. Student survey data and information from student unions are also evaluated, to gain some topics which should be improved for lecturers from students' points of view. Each semester, a methodological conference is organized. Materials of all events are available on ORTUS within the study course "Materials of the Centre for Academic Excellence".

Lecturers have the opportunity to improve their English language skills by applying to the courses offered by the RTU Institute of Applied Linguistics or by the RTU Riga Business School, which are organized thanks to SAM 8.2.2 project funding.

Educational events are also organized by the Career Support and Services Unit, providing regular seminars to RTU staff on the following issues: cultural diversity; critical thinking; youth psychology; team management; virtual processes and cybersecurity; burnout at work, etc. RTU IT User Support Center organizes training on IT systems and the latest technology tools for RTU staff. (SAR pt. 2.3.6.)

During interviews academic staff agreed that there are many opportunities to improve their skills, all the information is easily accessible, and they use the provided options.

1.3.7. 85% of the academic staff members are elected to an academic position at RTU, while 15% are employed temporarily for the implementation of the study process. RTU does not strictly distinguish academic and research workload, its proportion is determined for each academic staff representative individually when planning the workload of the employee at the structural unit, as well as taking into account their positions, involvement in the implementation of projects, professional competence, and experience. (SAR pt. 2.3.7.)

This topic was also discussed with the academic staff, they were satisfied with their workload. Most of their workload is research related (around 80%), therefore also their salary depends more on their research activities and much less on the academic side, including the variable number of students in SP. The experts believe the workload is balanced.

1.3.8. RTU Career Support and Services Department provides students with career and psychological support services. Career development support is offered to both prospective students (help to select SP, etc.) and to current students (such as seminars for career management, CV writing, summer camps, etc.). Vacancies for students are also posted on a joint platform (https://ekarjera.rtu.lv/).

Psychological support is available for difficulties that are related to studies and also for personal issues. There are also seminars and workshops held. (SAR pt. 2.3.8.) During the assessment visit this was discussed with representatives from the university and students, the experts confirmed that this help is easily accessible, the support can be offered in a timely manner and the consultations have helped students.

The student services offer seminars and individual consultations (for example, provides printing,

copying, and binding services; draws up references and transcripts; to first-year students informative classes within the framework of the study course "Introduction to Study Field").
RTU has made guidelines with recommendations for effective communication and improvement of the study environment for people with disabilities. (https://ebooks.rtu.lv/wp-content/uploads/sites/32/2020/10/789934225055-Personas-ar-invaliditati-specialajam-vajadzibam-RTU-PDF.pdf). At the faculty, there is a ramp installed, floors can be reached via an elevator or stairs that are equipped with lifts. Specialized WC'S are available for people with disabilities.
RTU International Cooperation and Foreign Students Department have academic consultants who consult foreign students on studies and practical issues. They help to adapt to the new university, orient themselves at a campus, as well as have a contact person for the immigration process to help with entry and stay in Latvia. (SAR pt. 2.3.8.)
RTU Student Parliament offers support and counseling in different structures to both local and international students. There are many extramural activities offered (https://www.rtu.lv/en/rtusp).

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

The financial support is strictly planned, and overlooked and allows study field development. There are regulations and systems set for financing. Funding for research is defined and available, and there are projects and grants available for scientists. A fair amount of funding is brought into the field from research projects where students of the field are involved.
The infrastructure of RTU is excellent and offers a large variety of equipment. Every year funds are planned and invested for the development and repairs on a material-technical basis. Methodological and informative provision is met by the Scientific library, which offers both physical books and e-resources. Replenishing the collection is regulated by inner regulations, where the staff can recommend the needed materials. RTU offers each user an electronic identity that works with all inner systems and allows them to access it with the same login info. ORTUS is the main gateway to all other systems and holds all the necessary information for the study process.
The teaching staff is elected in accordance with state and university regulations. The stakeholders are informed about available positions. Professional and didactic development is mostly organized by the Center of Academic Excellence. Other developments are offered by RTU Institute of Applied Linguistics, Career Support, and Services Unit and IT user support center. The workload of academic staff is balanced, mostly consisting of research activities.
There are support systems in place for students, such as psychological help that is easily accessible. There are guidelines for working with students with disabilities that help staff orientate their work and adjust. RTU International Cooperation and Foreign Students Department help integrate international students.

Strengths
1. There are internal grants for research that help researchers to achieve better scientific activities.
2. There is a large campus available that centers most of the study process in the same place.
3. There is a large variety (at least 50 different pieces of equipment, f.e., Compounder, 3D printers, autoclaves, spectrometers') of equipment for study process and research.
4. Scientific library has sufficient methodological materials that are replenished regularly.
5. There is psychological help available that is easily accessible and does not require a long waiting time.
6. RTU has developed guidelines for working with students with disabilities.

Weaknesses
1. RTU at this point is not considering distance study opportunities, which might attract international

students to the study programs “Financial Engineering” and “Financial Engineering Mathematics”

1.4. Scientific Research and Artistic Creation

Analysis

1.4.1. In order to implement RTU's vision “to become an internationally competitive, dynamic and modern university of science and technology”, RTU's strategy defines four main objectives for the period of 2021-2025: excellent science, high-quality studies based on science, innovation and cooperation with the industry, sustainable valorization and institutional excellence, that fully comply with the objectives and priorities defined in Latvian development planning documents (Sustainable Development Strategy of Latvia until 2030 (Latvia 2030); National Development Plan of Latvia 2021-2027 (NDP2027).
Research at RTU is organized on 6 research platforms: Energy and Environment, Cities and Development, Information and communication, Transport, Materials, processes and technologies, and Security and defense, where different Institutes and Research centers are participating and contributing to the research.
The study field "Physics, Material Science, Mathematics, and Statistics" is implemented by two faculties of RTU – institutes and departments of the Faculty of Material Science and Applied Chemistry and the Faculty of Computer Science and Information Technology. The main research in the study field is conducted at: the Institute of Applied Mathematics, Institute of Polymer Materials, Institute of Technical Physics, Institute of General Chemical Engineering together with the research centre “RTU Rudolfs Cimdins Riga Biomaterials Innovations and Development Centre”, Institute of Materials and Surface Engineering and Center of High Energy Physics and Accelerator Technology.
Discussions with different groups of study field implementers at RTU revealed that almost all teaching staff are employed as researchers at relevant RTU institutes and are contributing to the study process with their area-specific knowledge and expertise. A number of teaching staff are experts of the Latvian council of science.
Scientific research directions and activities implemented by the “Materials, processes, and technologies” platform, which is one of the priority directions in scientific activities at Riga Technical University, are focused on 4 main areas: Nanomaterials and Nanotechnologies; Green chemistry and bio-based technologies; Applied chemistry; Functional materials (https://www.rtu.lv/en/research/research-platforms/materials-processes-and-technologies). The scientists collaborate with national and international research institutions and industry and implement both the projects that are directly related to the materials and their properties research and the ones which are related to this field indirectly, for example, developing data processing, design, and forecasting software, carry out economic calculations for new material design or production technology. All these activities also fall under the scope of Latvian RIS3 directions of economic transformation, priorities, and areas of specialization, Priority 6: A developed knowledge base and human capital in areas where Latvia has comparative advantages and which are important in the process of economic transformation: knowledge areas related to biotechnology, smart materials, technology, and engineering, smart energy and ICT as well as EC identified key technology areas: nanotechnology, micro and nanoelectronics, photonics, advanced materials, and production systems, biotechnology (An Overview of Smart Specialization Strategy in Latvia, 2021: (https://smartup-bsr.eu/wp-content/uploads/2021/06/O2.6-Latvia-RIS3.pdf), thus indicating the strong engagement of the University in the economic development of Latvia via research activities and collaboration with industry.
The directions of scientific research of the study field "Physics, Material Science, Mathematics, and Statistics" correspond to the sustainable development goals of the RTU: which are outlined in RTU strategy 2021-2025 (https://www.rtu.lv/en/university/strategy):
- Goal 6. Ensure availability and sustainable management of water and sanitation for all;

- Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all;
- Goal 9. Build a sustainable infrastructure, promote inclusive and sustainable industrialization, and foster innovation;
- Goal 17. Revitalize the global partnership for sustainable development.

The relevance of research-based MSc and BSc studies for study field and industry was clearly indicated by industry representatives and study program graduates during the visit. However, industry representatives indicated the wish to be more involved in at least the development/improvement of study modules and the entire study program.

The RTU-LU joint doctoral study program “Particle physics and Accelerator Technologies” was launched in 2021 as one of the major components of Latvia-CERN collaboration and is implemented under the umbrella of the Center of High Energy Physics and Accelerator Technology which is responsible for Latvia’s cooperation with CERN. This international program is highly prioritized by the Ministry of Education and Science of the Republic of Latvia due to the education and training of internationally recognized young generations of experts which are lacking in this field in Latvia and research potential for Latvian researchers to perform/participate in world-class research at CERN. Program subjects that are related to the study field "Physics, Material Science, Mathematics, and Statistics" are fully “covered” by corresponding research. However, following the discussion with industry representatives, the industry needs for national particle physics specialists are not fully clarified and adjusted.

1.4.2. RTU structural units in which programs of study are implemented following strategic objectives which were set to justify connections between research and teaching activities: Quality studies - Excellent science -Sustainable valorization. In general, the synergy between scientific research activities and participation in the study process is achieved due to the fact that according to the RTU employment scheme, employees of research institutes are invited to participate in the study process. The invitation is based on the individual’s scientific expertise in the field of study and the candidate must fulfill the requirements set for academic staff (RTU Senate decision No.649; “On the Procedure of Election of Candidates to Positions of Professors or Associate Professors and the Procedure of Evaluation of an Existing Professor or Associate Professor”, 27.04). RTU does not strictly distinguish academic and research workload, its proportion is determined for each academic staff representative individually when planning the workload of the employee at the structural unit, as well as taking into account their positions, involvement in the implementation of projects, professional competence, and experience.

The link of scientific research to the study process is ensured using potential knowledge transfer principles and continuous improvement of competencies, which manifest in the integration of research results in study courses and study process, involvement of students in research, familiarizing of students with the latest research results, enabling them to conduct research work independently or in cooperation with experienced researchers. Besides this SAR provides some success stories when the results of projects are implemented in collaboration with different companies (SIA “MILZU!”, SIA “Nipon”, M. Radwański "Ekotex” (Poland), SIA “DTJ Sp. z o.o.” (Poland), SIA “Latvijas finieris”, SIA “Ceļu būves sabiedrība “Igate”, etc.) were integrated in student training by including the information on latest trends in the industry in the content of lecture materials and implementing practical works devoted to solving the problems faced by the manufacturer. The same could be said about the results obtained by the students working on BSc and MSc theses, especially in Material science-related programs.

It is evident that research-based studies are provided in doctoral study program Particle physics and Accelerator Technologies, however, science integration into the study process on the third level needs a regular, more accurate, and consistent approach, especially in terms of students’ participation in different seminars/events organized by CERN as a part of the program.

According to information provided in SAR, chapter 2.4 (Annex: “Summary of the results of the research activities of the teaching staff of the study field”, and Annex: “List of publications of study

field staff"), teaching staff of the study field during some period (period was not indicated) participated in the implementation of more than 68 scientific projects, including: 14 EU co-financed projects, 2 Horizon 2020 programs, 6 National research programs, 12 Projects funded by the Latvian Science Council, 34 Other research projects; participated in 129 local and international conferences with presentations; published 472 publications indexed in international databases (SCOPUS), including: 141 original research papers, 245 conference proceedings and 83 other publications; received 8 Latvian patents; submitted 42 Commercial offers. However, the document rather summarizes all research activities of teachers that are spread over different institutes, than providing selected information on teachers' research topics really related to the study field "Physics, Material Science, Mathematics, and Statistics", making the assessment procedure more complicated.

In general, the connection of scientific research in the study field with the study process is justified. However, due to the lack of common indicators, the assessment mechanism for the integration of scientific research and the outcomes thereof in the study process is not clearly defined and is regulated on a mutual basis mainly. Assessment reports regarding the research-based teaching and learning level in separate courses and in the programs are not compiled.

Students' surveys which include some information regarding study module content are conducted twice a year, but no official response to the students is provided. During assessment discussions, students and graduates indicated that the information regarding any changes or upgrades of study modules was obtained indirectly from a third party.

1.4.3. International scientific cooperation covers research topics related to the study field and is well established via the participation of research staff in 14 EU co-funded projects, 2 Horizon programs, and a number of postdoctoral research projects SAR, Chapter 2.4.3 Annex "Scientific projects with the participation of the teaching staff of the study field" and https://www.rtu.lv/lv/zinatne/pecdoktorantura/pecdoktoranturas-petniecibas-projekti).

In all study programs in the study field, all teachers and students may benefit from the collaborations that bring world-class research results to the university and offer research-based knowledge for the studies. Participation of staff in international consortia, with CERN on the first line, in COST actions and other networking activities, creates preconditions for the carrying out of high-level research and contributes to the economic growth of Latvia from one side and capacity building of teaching staff with upgraded knowledge and experience in the field from the other side.

Future plans for the development of international cooperation in the next five years as provided by FMSAC, FCSIT, and the Center of High Energy Physics and Accelerator Technology, are focused on more intense networking and cooperation in the project applications and high-quality publications, as well as participation (as a partner) in at least one Horizon Europe 2027 and also more active use of existing research infrastructure and equipment to make research conducted at RTU internationally visible. (SAR, p.)

However even having institutional and private contacts with world-class research centers and experts, and also with academic institutions in other countries, during the visit RTU staff from the study field under assessment declared a high overload of work when performing everyday tasks and insufficient amount of money allocated for the ERASMUS grants and were not showing interest to outgoing ERASMUS mobility, which may serve opportunities for networking activities. The incoming staff mobility (ERASMUS and other programs) in the study field is also very low and needs improvement (SAR 2.5, Annex "Staff mobility") since only very few incoming visits were carried out during last year (except for the relatively intense visiting program between CERN and RTU). It is to notice that the involvement of a visiting teacher/researcher in the study process is playing an important role in ensuring the link between science and research and studies content.

1.4.4. The RTU has a well-functioned mechanism for the involvement of the teaching staff in scientific research. It is regulated by the procedure for the election of RTU academic staff approved by the Senate "On the Procedure of Electing Professors and Associate Professors" and "On the

Procedure Of Electing Assistant Professors, Lecturers and Assistants" (publicly available at https://www.rtu.lv/lv/universitate/vakances-rtu/personalatlases-dokumenti) and by the procedure of periodic evaluation of scientific and pedagogical qualifications in accordance with the Procedure for Election of a Candidate for the Position of Professor or Associate Professor and the Procedure for Assessing the Qualification of an Existing Professor or Associate Professor approved by the RTU Senate meeting on 29 June 2020 (published at https://www.rtu.lv/writable/public_files/RTU_par_profesoru_un_asocieto_profesoru_periodisko_novertesanu_apstiprinasanu.pdf), where the set of requirements for scientific production (scientific portfolio) of the academic applicant are outlined.
However, there is no centralized mechanism for rewarding excellence in science indicated during the teacher's evaluation procedure. This may presuppose a researcher's decision to minimize efforts in the research area and concentrate on minimal requirements.
Research activities are concentrated in 6 research platforms, whereas the study platform "Materials Processes and Technologies" is directly linked with a study field "Physics, Material Science, Mathematics, and Statistics". Dedicated funding from the Research Support Fund (decision of RTU Senate No. 585 "RTU Regulation of Research Support Fund" as of 15 December 2014) is allocated for the implementation of planned research activities, which foster the development of the strategically important research fields, including support for maintenance of research equipment, protection and licensing of intellectual property, covering of expenses related to the doctoral study process, publishing of scientific journals, participation, and organization of scientific conferences, support to researchers in establishing new laboratories in a prospective research field, conduction of selected internal projects.
In addition, the Research Excellence Grant for young scientists was established in 2018 as a new initiative, providing 270 000 EUR for a 3-year period based on international competition (conditions are similar to EC ERC grant with international call and evaluation performed by external, i.e., foreign well-recognized researchers). The grant allows young and talented researchers to establish their own research groups and make a researcher's career at RTU.
The efficiency of these mechanisms is illustrated by the growth and quality of SCOPUS-indexed publications.
1.4.5. RTU has mechanisms for the involvement of students from all study levels and programs in research activities, which are aimed at:
- strengthening the doctoral studies and providing career opportunities during the post-doctoral period to young researchers;
- involvement of doctoral students as full-time early career researchers in research;
- Involvement of Doctoral, Master, and Bachelor level students in the implementation of internal (research platform-based projects);
- Involvement of interested students in the scientific work at the structural units implementing the study program and with their cooperation partners;
- Involvement of the students in conducting research on topics of interest of certain companies. Also, the conduction of final thesis-related research is possible.
During discussions, the University administration indicated that almost all BSc and MSc thesis topics are industry related and the majority of students are already employed.
However, discussions with students and graduates revealed that MSc students who are employed at research institutes have topics from the institutional research field, but only very few topics for MSc and BSc students are coming from the industry. Students expressed their wish to the administration to strengthen collaboration between university and companies and provide more possibilities to participate in industry-related research.
The employers also indicated their wish for closer collaboration with the university involving students in solutions to company-born problems relevant to the study field.
1.4.6. The study process implemented within the study field is linked to technological innovation in

products and processes. Application of innovative solutions allows for improving students' understanding and knowledge of the importance of innovation in the sector in all fields of study at the appropriate level. There are some examples of implemented activities:
Very innovative and having a significant impact on the study process, the study module "Vertically integrated project" offered by the design Factory of RTU was included in the BSc study program curriculum. During this course, interdisciplinary student teams develop a challenging long-term research project under the guidance of experienced researchers and gain experience in research as well as in team and project work.
Students have the opportunity to participate in activities of DF Labs (http://rtudf.rtu.lv) for developing, designing, and prototyping new products and technologies, based on the ideas of students and researchers. The activities are strongly linked to industry.
The study module for the bachelor "Development of innovative products and entrepreneurship" is based on co-creation and learning by doing. It integrates the parties involved in the development and commercialization of new processes and products into the study process and provides continuous feedback on the results/achievements of the student groups involved in the study process.

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

RTU strategy defines four main objectives for the period of 2021-2025: excellent science, high quality studies based on science, innovation and cooperation with the industry, sustainable valorization and institutional excellence, that fully comply with the objectives and priorities defined in Latvian development planning documents (Sustainable Development Strategy of Latvia until 2030 (Latvia 2030); National Development Plan of Latvia 2021-2027 (NDP2027).
In general, well established research infrastructure, well organized research activities, scientific qualification of staff (teachers-researchers), performed high level scientific research on national and international scale allows to achieve the synergy between scientific research and study field "Physics, Material Science, Mathematics, and Statistics" and implement science-based studies on bachelor's, master's and doctoral level that meet requirements set for study field.

Strengths
1. Well established research infrastructure.
2. In general, all parties (teachers, researchers, industry partners and students) are to some extent involved in research and contribute to the development and design of study programs.
3. Cooperation with CERN in the framework of the doctoral study program "Particle physics and accelerator technologies" contributes significantly to international visibility and recognition of RTU.
Weaknesses
1. Potential of collaborative research with industry is not fully explored.
2. Less than half of BSc and MSc programs teaching staff are really active in research (projects, publications). It seems that the majority of staff is just keeping on minimal requirements for being elected/ assessed for the next 6-year teaching period.
3. Low mobility of MSc and BSc programs teaching staff (ERASMUS teaching and research grants, sabbatical leave, others). Only 10 staff members from all BSc and MSc programs participated in outgoing mobility during the assessment period: some of them - several times. Only 1 person from the "Mathematics and statistics" part of the study field was participating in outgoing mobility.

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

According to provided information, scientific research related to the study field “Physics, Material Science, Mathematics, and Statistics” is fully compliant with the level of development of scientific research

1.5. Cooperation and Internationalisation

Analysis

1.5.1. During discussions and deliberations with management, academic staff, and students, it was clear that RTU is connected with educational institutions from Latvia (such as the University of Latvia, Rīga Stradiņš University, BA School of Business and Finance, and other higher education institutions). In addition, during the meeting with graduate students, it is clear that also Latvian University, the Institute of Solid State Physics, and the Latvian State Institute of Wood Chemistry are involved in the process. Also, the ability to form a new PhD program in collaboration with the University of Latvia indicates a strong, long-lasting relationship.
The self-assessment report in section 2.5 indicates that there is a collaboration with industries and potential employers (as listed in Annex “Annex List of cooperation contracts.zip”). In addition to available information, during interviews with employers, it became evident that actual cooperation also includes such companies as LAA- Latvian Actuarial Association, BTA, AS "Citadele banka", SIA SAKRET, and more. All companies were satisfied with students doing internships during the study period and with the skills of graduate students.
Although during interviews it became evident that collaborating companies become involved only in case when a graduate student from a given study field becomes an employee with successful career growth. This looks to be the main way how a cooperation partner is chosen and becomes involved. But since the study program gives a broad spectrum of knowledge to students in the field of “Physics, Material Science, Mathematics, and Statistics”, it would be recommended to involve more companies that could benefit from collaboration for a given study field. In Annex ``Local partners of study field.docx” only 6 companies are listed that mostly specialize in the field of material sciences closely related to chemistry. The list should be improved by companies from the financial sector, insurance companies, and companies dealing in material sciences or nanotechnologies. Especially since experts heard good feedback from graduate students working at such companies as “SIA Light guide optics international”, “Hansamatrix” and others.
Also, it would be recommended to increase the visibility of study programs to relevant industries to be able to recognize a potential workforce that is coming from RTU. This will contribute to unexpected corporations for now and near future. Experts would leave RTU to decide on the best approach to this task. It might be better visibility on social media platforms such as LinkedIn or even more direct proactive communication with companies related to the field.
1.5.2. RTU has a long list of collaborations with scientific or educational institutions abroad (see the list section 2.5.1, Annexes “Cooperation partners of the teaching staff and institutions of the study field.docx” and “Annex List of cooperation contracts .xlsx”). The most recent collaboration with CERN has provided a unique opportunity to develop a new study program. This gives a possibility for students in the Baltic states to deep dive into the field that would be available only abroad.
1.5.3. In section 2.3.5 of the self-assessment report the information is adequate and has proof of sufficient mobility and procedures to attract students from abroad.

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

The collaboration with educational instances and industry is adequate. The only suggestion would be to increase the visibility of the study field and graduate students to the wider range of companies (potential employers) and wider society in general.

Strengths
1. Well established collaboration for educational institutions in Latvia.
2. Involvement of potential employers within study programmes.
3. Good reviews from graduates that are working at scientific institutions and industry positions.

Weaknesses
1. Poor visibility of study programmes and skills of graduate students to a broader spectrum of potential employers.

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

Cooperation of RTU with Latvian and foreign institutions in the study field in Experts' opinion is adequate to fulfill the requirements and to achieve the aims of the study field. Assessing study programmes it was noticed that in some cases employer involvement is based on historical cooperation and there is a lack of new members from industries that would benefit from involvement in developing, maintaining, and providing internship opportunities. In Experts opinion there is more or less closed circle of companies, who cooperates and it is quite difficult for new companies to enter the circle. To assure that cooperation remains relevant, for further development RTU should involve more companies from different areas of industry.

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

Analysis

1.6.1. In terms of the study field "Physics, materials science, mathematics and statistics" the previous assessment review formulated several recommendations. Most of them have been taken into account and fully implemented, while the implementation of some of the recommendations is still an ongoing process.
It is a good sign that no general problem has been observed considering the entire study field, and all the recommendations are about the specific study programmes, being mostly rather technical than theoretical issues.
SP “Financial Engineering”: the committee asked to elaborate an analysis of the labour market demand given the very broad choice of elective courses in the programme. The regional needs have been assessed and the results of this assessment have been effectively incorporated into the programme. The proposed activities and the foreseen results are appropriate, and the recommendations have been fully implemented.
SP “Materials Engineering”: A technical improvement was asked by the previous committee to modify the title of the degree to better cover the actual studies. This has been done and confirmed by the SKK on June 30, 2021. Another recommendation was to make the publication activities of the teaching staff regular and visible. This has been partially done, providing the list of publications. Therefore, the short-term recommendations have been implemented so far.
Considering the long-term recommendations, the renewal and update of literature have been started, and the technical issues about the transition period were resolved, by providing information and offering potential individual study paths for students, which is a very positive approach.
In terms of the more active involvement of partners from the industrial sector in the teaching process, providing opportunities to improve English language skills for the students, etc.: some

efforts have been made, and some preliminary results have been achieved, but these occasional opportunities (e.g. giving lectures by industrial staff) must be regularized and systemized. The number of partners who regularly offer internships and further support must be increased (currently only two industrial partners were mentioned). In the previous report it was mentioned that industrial partners “repeatedly emphasized that they would be happy to get involved in improving students' skills”, and this was actually the case in the current meetings - consequently there is still room for improvement and the willingness of the industrial sector must be exploited in a more systematic manner.
SP “Materials science and nanotechnologies”: the short-term technical recommendation has been fully taken into account and implemented as of January 2021.
On a long-term basis, one recommendation was to strengthen the development of soft skills in the curriculum. Effective steps have been taken, important courses have been offered to the students this term, and this portfolio is continuously improving, which is a good sign. The implementation of this recommendation is on a good track.
Further long-term recommendations were related to the need for widening the cooperation with industrial partners asking them about possible internship offers. Two agreements have been reached, and further agreements are foreseen, which is a positive sign, but further efforts must be made to provide a real widespread and rich portfolio of industrial visits. A significant improvement is promised for the academic year 2022/2023 - this needs regular and systematic work on this topic.
A couple of recommendations were related to the teaching staff, where an improvement is definitely present: some young colleagues have arrived, and the English competency - as the current meetings also confirmed - is getting more and more appropriate. The high-level (Q1-Q2) publication activities are also improved, but this is evidently a never-ending process.
One recommendation was about implementing steps to the improvement of attracting students. A very good idea is the plan of an international joint Master, where the initial steps have been made, but this needs further significant effort and maybe a good proposal for the Erasmus Mundus Joint Master programme. Local campaigns are also organized, but their effectiveness is evidently limited.
One last recommendation was to consider the possibility of being included in the international pedagogical skills improvement program for teaching staff with the aim of obtaining the ING.PAED.IGIP certificate. It looks like nothing happened in this term; the assessment report provides only a generic sentence in the future tense - this is a recommendation where seemingly nothing happened since the last accreditation visit.
SP “Financial Engineering Mathematics”: for this study programme only, technical recommendations have been formulated, and all of these technical issues have been successfully resolved. Therefore, all the recommendations have been successfully implemented.
Particle Physics and Accelerator Technologies: for this doctoral programme the short-term technical recommendations have been successfully implemented, or, in the case of literature, convincingly replied. An important issue was the quality assurance mechanism, and the DSP-specific quality assurance mechanisms have been developed, improved, renewed and changed by the DSP Council. It is an important positive aspect.
On a long-term basis, all considerations have been fully taken into account and the initial steps toward the realization of the relevant recommendations (establishment of a Master's programme, creation of research labs) have been convincingly described. Of course, more efforts are needed to fully realize these recommendations, but this needs time.

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

The recommendations of the previous committee can be divided into two classes: technical and structural recommendations. All the technical recommendations have been successfully implemented, sometimes with the joint effort of the university leaders and the staff responsible for

the programs This is very positive.
Many of the structural, typically long-term recommendations are also taken into account and effective steps are taken toward the full implementation of these recommendations These steps and implementations are currently at a different levels. There is one recommendation where seemingly no activities have happened, and this is the improvement of the pedagogical skills of the teaching staff. A further issue is the effective involvement of industrial partners, where steps have been reported, but during the current visit, the committee still observed the lack of a systematic approach to effective, regular involvement of the industrial partners.

Strengths
1. All technical recommendations are fully taken into account and implemented.
2. Effective steps toward the realization of many of the long-term recommendations.

Weaknesses
1. Lack of systematic approach of effective, regular involvement of the industrial partners.
2. No visible efforts toward the improvement of the pedagogical skills of the teaching staff.

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

Elimination of deficiencies and shortcomings identified in the previous assessment of the study field are done, with exception to ones related to involvement of industrial partners and improvement of pedagogical skills of academic staff. Information on implementation of the recommendations was provided.

1.7. Recommendations for the Study Field

Short-term recommendations

1. Quality check of the study courses must be done with respect to used literature. Used literature must be from the latest years (literature should not be older than 10 years, recommended at least 50% from last 5 years, with very few well-argumented exceptions, otherwise study courses cannot be considered as up to date). Books in Russian should be excluded.
2. Create requirements for academic staff on what materials should be placed for students in ORTUS and ensure that academic staff follow these requirements.
3. Arrange procedure and implement it from next study semester on providing students and other stakeholders with feedback on survey results, where they participated.

Long-term recommendations

1. Procedure should be established, how any industry company from the respective field can get involved with the study field and programmes. Information should be made publicly available. Also, arrangements must be made to systematically involve industrial partners, for example through guest lecturers for the whole study courses.

2. RTU should make an effort to ensure information available for potential students who are not particularly searching for it - for instance information on social networks, like Facebook or Instagram. Information from research projects, student’s life, about academic staff involved in programmes is highly advisable seeking to attract new students.
3. Master programme should be introduced to ensure seamless transition to the doctoral programme of the study field.
4. Setting up higher requirements for admission (mathematics for instance) therefore ensuring less dropout and more homogenous study process.
5. Considering organizing additional courses in, i.e., mathematics and other curriculums, for first-year master students to ensure equal knowledge level between students, to ensure a more homogenous study process and less dropout.
6. Implement strategy on how to improve mobility for students and academic staff.
7. Implement strategy on how to engage the staff to generate more scientific production (publication of articles, project activities).
8. More efforts from the faculties side are requested for the improvement of the admission rates, i.e., communication to school children about the importance of this study field and about future career possibilities.
9. Develop a system which is responsible for prevention of high drop-out numbers of students in the first year, for instance adjustments of curriculum, offering of additional courses to supplement lacking skills, mentoring program by involving students from later study years etc.

II - "Financial Engineering" ASSESSMENT

II - "Financial Engineering" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Study programme “Financial Engineering” itself complies with the study field, however, there was noncompliance with the professional standard, which must be taken into account since particular programs are professional study programs.
During the visit, the situation with professional standards and qualifications graduates will receive was discussed in detail with the program director and it was agreed to adjust qualifications accordingly. The title, code, degree to be obtained, aims, objectives, learning outcomes, and admission requirements are interrelated.
2.1.2. Professional qualifications of the study program do not comply with the professional standard, namely there is no corresponding professional standard. It was agreed with the program director, that professional qualification will be adjusted to the SENIOR DATA ANALYSIS SPECIALIST with specialization - Financial statistician (according to the corresponding profession standard, confirmed on June 8th, 2022 - https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-224.pdf).
Adjustments must be done before study program accreditation. Adjustments must be done also to the template of the diploma accordingly.
The duration and scope of the study program implementation, as well as the implementation language, are reasonable and justified.
2.1.3. No changes have been made to the parameters of the study program during the reporting period, with the exception to the obtained qualification, described in detail in the previous chapter.

2.1.4. Graduates of the program are in high demand on the labor market, working both as financial analysts and in related professions, such as data analysts. During interviews with graduates and students, this information was confirmed. Normally students find jobs during the study process before graduation.
However, supplied information about the number of students shows that during the 9-year period (2013 - 2021) about 20 students per year enrolled in budget places, a little bit smaller amount - in self-paying places. It can be estimated that the overall number of students is about 35 in total. Graduates are about 15 students per year. The number of students and the number of graduates is slightly growing up year by year, however, the number of students is not exceptionally high.
Experts appreciate that RTU has specific requirements for students regarding basic knowledge of mathematics, but it seems that the university can do better with marketing activities and the development of study programs, in order to increase the number of students.
The number of students, in general, seems adequate to consider a study program economically justified.
2.1.5. Not applicable

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

Study programme Materials Engineering (43526) complies with all requirements with exception of profession standard. It was agreed with the programme director, that adjustments will be made prior to the end of the accreditation process and professional qualification will be adjusted to the SENIOR DATA ANALYSIS SPECIALIST with specialization - Financial statistician.
Study programme is justified in every aspect, however more efforts must be made to increase the number of students, thus attracting more funding to the study programme and also making the study process more interesting to the students.

Strengths
1. Study programme is well developed and RTU has all the necessary resources to perform activities to attract more students to the programme.

Weaknesses
1. Public recognition of the study programme in order to attract more students both local and from abroad
2. Program management has no practice to invite guest lecturers for the complete study course. Such practice can help programme to attract new specialists and make study programme more up to date regarding modern technologies and methods and regarding latest problems being solved in the industry as well.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. Theoretical background is provided through a wide range of topics in the curriculum. On the one hand, this provides a good overview of the basics for the students, but on the other hand, there are courses where the connections to the actual field (Financial Engineering) should be better emphasized. Courses such as DMS120 Mathematics and MFZ109 Physics can only be useful if these connections are clearly demonstrated, instead of providing some independent basic mathematical and physical background. This is very much an application-oriented study program, there is no need for too much theory in Mathematics and especially in Physics.
The list of elective compulsory courses is impressive, providing a wide variety of specific topics to study. It is a strong point of the curriculum.

However, in terms of soft skills, the curriculum must be improved. Currently, only a few soft skill courses are offered in section B2. A much wider selection of courses dedicated to the development of soft skills should be provided in this section of the curriculum, and maybe also in the free electives (section C).
2.2.2. N/A
2.2.3. It is clear from the report that parts of the study program are implemented in a student-centered way. The staff puts effort into providing information in various ways, not purely as lectures. It is also well-thought-out that practitioners and professionals from different institutions are invited to deliver individual lectures within the study courses in order to promote the unity of theory and practice.
That said, the ratio of project work, individual tasks, and real-life problem-solving should be increased over frontal work and oral exams, in favor of getting closer to the world of work from the very beginning of the studies.
2.2.4. This study program leads to a professional bachelor's degree. A very important part of the study experience in the field is the possibility of practical placements. Some of the internship places are commercial banks and insurance companies (SAR 3.2.4.), fully in line with the expectation of the students. It is evidently a positive sign that the students were satisfied with their internships. As it is mentioned during the visit, many students stay to work at their previous internship places.
The program is delivered in the Latvian language.
2.2.5. N/A
2.2.6. The topics offered for the final thesis well cover various aspects and subfields of the study program. Almost all of them are about some application of the acquired knowledge, which is a plus. However, in many cases, these “applications” remain at the academic level. More “real-life” topics and problems, potentially coming from existing or future industrial partners should be offered for thesis topics, with a potential co-supervising system.

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

Overall, the curriculum and the entire study program are well organized and cover all the topics required for providing the necessary field-specific learning outcomes. It is less so in terms of soft skills, where the number and topics of elective courses must be widened. Pure theoretical subjects, notably the course of Physics, must be adjusted to better suit the application-oriented approach without providing too much highly theoretical background. Real-life problems coming from external partners (future employers) would be better incorporated into the practice and the thesis topics.

Strengths
1. Good coverage of theoretical background.
2. Efforts made towards a student-friendly and student-centered approach.

Weaknesses
1. Soft skills are not fully covered.
2. More real-life problems, tasks, and thesis topics are needed.

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

n/a

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. Studies are organized at the RTU campus Ķīpsala and implemented at the Faculty of Computer Science and Information Technology, where there are available modern classrooms and auditoriums with computers if those are needed for classes. (More information in section 1.3.2.) The students of this SP mentioned that one of the disadvantages was the old building on Meža street, however, this issue has been solved since the new faculty was opened at the campus and now all the classes are held there. The academic staff mentioned that there are available licenses for Bloomberg terminal and Jumis that are being used for practical classes.
The scientific library of RTU provides the needed methodological and informative resources for this SP in both printed versions and e-resources. In the assessment period for the topic of "Financial Engineering," 62 books were purchased amounting to 4180,46 EUR by the library. (More information in section 1.3.3.)
The teaching staff pointed out that all the materials, slides, and instructions for practical work are placed in ORTUS and therefore always available for students.
2.3.2. N/A.
2.3.3. For the study year 2022/2023 there were 26 state-funded study places available, the fee for self-paid places was 2550 EUR per year. For the study year 2021/2022 there were admitted 21 students in state-funded budget places and 15 to self-paid places. Altogether in the SP (for all 4 years) in 2021, there were 73 students in budget places and 37 in self-paid places. In the assessment period, there is a slight decrease in state-funded budget place student numbers (from 80 in 2016 to 73 in 2021), however, is an increase in tuition fee-paying student numbers (from 8 in 2016 to 45 in 2020). (SAR 3.3.3.) Such an increase in tuition-paying students is healthy finance-wise for the SP and in case of dropout of budget place students, the spots can be filled by tuition-paying students.
For the development of all SP, centralized funding is used for the renewal of the collection of the Scientific Library, improvement and maintenance of joint-use premises, public relations, program marketing activities, development and maintenance of information systems related to the study process, development of Ķīpsala Campus and other activities. (SAR 3.3.3.)

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

The study provision is sufficient for the implementation of the SP. Studies are held at a new and modern faculty building that offers classes with computers. There are available needed programs with licenses. The methodological and informative resources are accessible to students via ORTUS and are sufficient.
Even though there is a decrease in budget-funded study places, there is an increase in the overall student number in the SP in the tuition-paying fraction, which allows filling all the budget places in case of dropping out. The finances are balanced.

Strengths
1. The study process is held at the new and modern faculty building.
2. There is an increase in the overall student number in the SP.

Weaknesses
1. There is a decrease in state-funded budget places (from 80 in 2016 to 73 in 2021).

Assessment of the requirement [6]

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

Assessment of compliance: Fully compliant

The resources are sufficient for the implementation of the SP. The finances are balanced.

2.4. Teaching Staff

Analysis

2.4.1. According to SAR (p. 128) the program is implemented at the Faculty of Computer Science and Information Technology, but the study program also involves the academic staff of other organizational units of RTU. In total, 37 PhDs (8 PhD in Mathematics, 13 PhDs in Engineering and Computer Science, 12 PhDs in Economics, 1 PhD in Physics, and 3 PhDs in Psychology and Sociology) and 8 lecturers having master's degrees are involved in the implementation of the study program “Financial Engineering''.
The qualification of academic staff complies with the requirements set forth in the regulatory enactments.
Selection criteria for the program implementing academic staff are justified with the focus on the teaching and research experience of the candidate in the study field and his/her expertise on specific topics of the course which is aimed to be taught. This ensures the creation of a teaching team that is able to ensure the achievement of the aims and learning outcomes of the study program and the relevant study courses.
2.4.2. Information provided in SAR (p.133) indicates the reduction of highly qualified teaching staff (professors and assoc. prof.) by 15% due to retirement (mainly) during the period 2013-2022. The number of docents was increasing by 11% during the same period and some leading researchers from the industry were hired in order to ensure the link between academia and industry in this program. This indicates that the university has managed changes in teaching staff composition according to the requirements specified in regulatory enactments and the head of the study program was able to ensure that staff changes do not negatively affect the quality of the implemented study program at the moment.
However, the reduced number of qualified staff is a warning signal for the program implementers. Discussion with academic staff during the assessment visit revealed, that the requirements for the election to academic positions have been newly increased and more scientific input is needed, which is the main obstacle in fulfilling requirements for the higher academic positions.
2.4.3. N/A.
2.4.4. According to information provided in SAR (p. 128-132) only 14 staff members from 37 have requested publications, some of these publications are just conference abstracts. There is no information provided regarding participation in research projects.
The situation with recent scientific activities of the staff is very dangerous. The academic positions held by staff members cannot be questioned now, since they have been awarded following requirements of the Latvian Ministry of Education and Science and RTU regulations. However, it will not be possible to keep academic positions in the future without a scientific output (research projects, publications). This may lead to the lack of qualified staff and the closure of the program.
2.4.5. According to SAR (p.134) and information obtained from the discussions with the staff members and head of the study program there is a kind of mechanism promoting mutual collaboration between academic staff, which is based on meetings where the course content, the interconnection between similar courses, integration of new teaching methods, activities devoted to the covering of previous knowledge gaps of students are discussed. The program syllabus is

discussed once per year, including discussion regarding improvements that may contribute to the achievement of the study program aims and successful implementation of the overall program.

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

The study program “Financial engineering” temporarily fulfills minimal formal requirements set for the implementation of the program. However, teaching staff composition is a hot topic, since (according to provided information) only 1/3 of teaching staff are active in scientific research and there are no plans provided on how to improve the situation.

Strengths
1. Existing selection mechanism of teaching staff members, incl. teachers coming from other environments.
2. Existing procedures for the improvements of a study program and separate courses.

Weaknesses
1. Decreasing number of qualified staff (number of professors dropped down by 8%, and of assoc.prof - by 9%.)
2. Weak and passive participation of the staff in research activities; only ⅓ of teaching staff is actively participating in research via publications; no plans regarding the intensification of research activities.
3. Weak /no participation in staff mobility programs, since only one person took part in mobility program during the last 6 years

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

RTU provided information which indicates full teaching staff compliance with the the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.
Program is given in Latvian language. There were no visiting 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

In general study programme complies with Cabinet Regulations No.512 of August 26, 2014 “Regulations on the Second Level Professional Higher Education State Standard”. Programme includes compulsory part (94 CP), limited-elective study courses (28 CP) and elective study courses (6CP). Traineeship is in the amount of 20 CP. The state examination, which includes the development and defence of the Bachelor's paper, is in the amount of 12 CP. The study programme includes courses which ensure the content requirements for study courses specified

in the Environmental Protection Law and Civil Protection Law.
Considering the submitted documents, programmes compliance is assessed to professional standard "Senior Data Analysis Specialist" (approved in 12.10.2022.), however, as the qualification to be awarded RTU indicates professional specialization "Financial statistician" for which no separate standard or professional qualification requirements have been approved. Therefore, experts conclude, that programme follows requirements regarding approved professional standard, however, qualification to be awarded should be changed - more detailed analysis of this issue is included in the assessment of the second point of this section.

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

Provided annexes are in compliance with the "Senior Data Analysis Specialist" professional standard (https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-224.pdf (in Latvian)). However, with regard to the qualifications to be awarded, RTU has indicated that it wants to award the qualification "Financial statistician" which is specialization for the professions standard "Senior Data Analysis Specialist". In accordance with the Latvian regulatory framework, the specialization also should have separate professional qualification requirements, which are currently not approved. As a result, the experts conclude that RTU cannot award the currently specified qualification "Financial statistician", taking into account that the comparison was made with another valid standard, it would be more appropriate to award the qualification "Senior Data Analysis Specialist"

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

Descriptions of study courses and study materials are prepared in Latvian and English (Annex 3.2.). Study courses and study materials are drawn up in accordance with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions.

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

Assessment of compliance: Fully compliant

Attached Sample of the diploma (annex 3.1) complies with MK 16.04.2013. not. Nr.202 https://m.likumi.lv/doc.php?id=256157
However, in accordance with the above-mentioned about the awarded qualification, these amendments must also be made in the diploma.

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

N/A

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

N/A

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

In compliance according to the provided documentation in Annex 2.3

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

N/A

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

As provided in Annex 2.1, in compliance with MK 23.01.2007. not. Nr.70
https://likumi.lv/ta/id/152072-studiju-liguma-obligati-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

Is confirmed as stated in Annex 2.1

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

Is confirmed as stated in Annex 2.1

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

N/A

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

N/A

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

Study programme mostly meets the requirements of the external regulatory framework, at the same time, it is essential to specify the qualification to be awarded according to the professional standard with which the study programme has been compared - "Senior Data Analysis Specialist", as well as, it is necessary to clarify the information in the awarded diploma.If the indicated corrections are made this requirement could be evaluated as Fully comply.

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

Considering that during the visit RTU agreed to clarify the qualifications to be awarded, programmes content and available resources, study programme can be evaluated as excellent. Programme has good coverage of theoretical background. Efforts are made towards a student-friendly and student-centered approach.
Study programme is justified in every aspect. Weaknesses, which must be improved, are related to the increasing number of students and improvement of academic staff, but in general, they are more focused on further improvement rather than on the elimination of significant shortcomings
For further development, effort in experts' opinion must be made to increase the number of students, thus attracting more funding to the study programme and also making the study process more interesting to the students.
More effort must be made also in terms of including more soft skill subjects into the study process and also more real-life problems solving tasks and topics for the thesis.
Decreasing number of qualified staff (number of professors dropped down by 8%, and of assoc.prof - by 9%.) is noted and also weak and passive participation of the academic staff in research activities via publications and mobility programs, however, considering that this is a professional study programme, experts believe that the existing qualifications of teaching staff help to ensure the study programme at a high level.

Strenghts:
1. Programme has good coverage of theoretical background.
2. Modern and up-to-date infrastructure and material and technical support.
3. Efforts made towards a student-friendly and student-centered approach.

Weakneses:

1. The number of students in the programme is rather small
2. Effort must be made also in terms of including more soft skill subjects into the study process and also more real-life problems solving tasks and topics for the thesis.
3. Decreasing number of qualified staff is noted and also weak and passive participation of the academic staff in research activities via publications and mobility programs.

*Professional qualifications of the study programme do not comply with the profession standard, namely there is no corresponding profession standard. It was agreed with the programme director, that professional qualification will be adjusted to the SENIOR DATA ANALYSIS SPECIALIST with specialization - Financial statistician (according to the corresponding profession standard, confirmed on June 8th, 2022 - https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-224.pdf). Also, template of Diploma must be adjusted accordingly.

**Adjustments must be done before study programme accreditation.

Evaluation of the study programme "Financial Engineering"

Evaluation of the study programme:

Excellent

2.6. Recommendations for the Study Programme "Financial Engineering"

Short-term recommendations

1. Corresponding recommendations to the study field apply.
2. Encourage each teaching staff member to participate in at least 1 mobility activity during the accreditation period
3. Encourage each teaching staff member to publish at least 2 papers in journals included in SCOPUS or CA WoS databases during the accreditation period.
4.To change the title of qualification from "Financial statistician" to "Senior Data Analysis Specialist" based on professional standard approved in 12.10.2022.”. (must be implemented before the decision on the accreditation of the study field is made).

Long-term recommendations

1. Corresponding recommendations to the study field apply.
2. Elaboration of a long-term strategy on how to support the career path of teaching staff.

II - "Materials Engineering" ASSESSMENT

II - "Materials Engineering" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Compliance of the study programme to the study field is described in section 3.1.2. of the Self- evaluation report (page 167).
By evaluating supplied documents and obtained information during the Experts' visit it can be concluded that the study programme complies with the study field.
2.1.2. The title, code, the degree to be obtained, aims, objectives, learning outcomes and admission requirements are interrelated. The duration and scope of the study programme implementation, as well as the implementation language, are reasonable and justified.
2.1.3. RTU provided a review of the implementation of the recommendations provided by the licensing experts.
Short-term recommendations are implemented.
A long-term recommendation was suggested to involve more industry representatives and also to evaluate possibilities to attract more international students. As Experts noticed during the visit, there are several industry partners involved in the development of the study programme, however, it was also noticed that there is no clear way, how to get involved with RTU. There are companies interested in cooperation, however, it seems that only a short list of companies can actually affect programme development.
Also, it was noted that there are some attempts to attract international students during visits abroad and other activities, but it was also mentioned that there is no special emphasis on this particular study field or programme, so in a sense information about the study field and its programmes can get lost in the overall information.
It was recommended to renew lists of recommended literature in study courses indicated in the study course description. The recommendation was to not use, if possible, literature older than a decade. It was noted that there is still outdated information. For instance, study courses DIM212 and DIM710 include a book on Calculus dated 1988, course DMS212 book on Statistics from 1985, course HSP375 book on Designing effective organizations from 1983 and a book on Complex organizations dated 1986, etc. Although there may be industry-specific books, recommendations cannot be considered as implemented.
The remaining recommendations about informing students are implemented.
2.1.4. On the one hand, experts appreciate the labour market needs for specialists in the current field. It is noted that students and also graduates confirm that there were almost no problems whatsoever finding a job in their respective fields.
On the other hand, it is also noted that the number of students who matriculated is very low - according to the provided data, there are about 20 or fewer 1st-year students and only a few graduates. Seems that most students drop out within 1st study year. It is also mentioned by academic staff and students and graduates that sometimes lectures are organized only for 2 - 3 students. It seems that the existence of such a programme cannot be economically justified in general.
However, in this particular case according to the management and also academic staff, their main work is related to research and lecturing can be estimated as 10% or so for some staff. Also, study courses are managed in a way that students from two study years can take it together, therefore, increasing the number of students in the group.
It cannot be said that the number of students changes noticeably from year to year, moreover, the total number of students is not high.
2.1.5. N/A

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

Study programme “Materials engineering” fulfills the requirements set by corresponding authorities and represents a well-established and well-functioning study programme implemented by carefully

selected highly qualified staff who are experts in their fields and actively participate in scientific research and teaching.
RTU has a great reputation in engineering. Also, there are lots of academic staff who can provide high level lectures for students. RTU also has various laboratories for almost every aspect of material sciences, varying from simple laboratory equipment as scales and mixers and ending with state of the art spectrometers.
Special attention must be paid to a wider selection of courses to develop relevant soft skills and transversal competences.
Weaknesses, which must be improved in general, are more focused on further improvement rather than on the elimination of significant shortcomings. For example, Experts were convinced that the RTU study program financing procedure, even with a low number of students, allows to ensure a successful study process. During the assessment process attention was paid to cooperation with industry companies, experts concluded, that there is a list of companies who work with RTU, and for others there is no visible way to participate. But on the other hand, the ones who are involved with RTU really work with the university, provide study processes with samples for research, give guest lectures etc. The fact that there is no visible way for others to get involved is something to improve, but the programme as it is now can be evaluated as Excellent.

Strengths
1.RTU has a great reputation in engineering.
2. There are lots of academic staff who can provide high-level lectures for students.
3.RTU also has various laboratories for almost every aspect of material sciences, varying from simple laboratory equipment such as scales and mixers and ending with state-of-the-art spectrometers.
4. There is a strong scientific library that offers the needed methodological and informative provisions as well as material-technical provisions, which helps to implement programme in excellent level.
5. Well-thought-out structure of the curriculum.

Weaknesses
1.There is no visible way for new companies how to participate in study programme (new partners could help further improve the spectrum of areas study programme can cover).
2.There is no general understanding in society of what Material sciences mean.
3.There is a very low number of students in the program.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The curriculum of this study program fulfills all the official requirements, it is fully in line with the regulations. It is an asset that industrial players have been involved already in the development phase of the curriculum, and this is well reflected in the practice-oriented approach of the program.
The wide variety of specialization is evidently a positive aspect of the study program, although the Biomaterials specialization is less well-structured than the others - only four courses are available with relatively high (4-6) credit points and with no clear justification (all the other specializations contain more courses for 2-3 CPs). As a content-based critical remark, composition materials and in general state-of-the-art materials could be better incorporated into the curriculum to provide up-to-date knowledge.
The selection of courses in the section related to the development of soft skills (B2) should be reorganized. There are very relevant courses, such as Startup Entrepreneurship, but three courses about Sociology (HSP375, HSP376, HSP377) are simply too much, this amount is not justified by the

overall aims of the study program. At least two of them should be replaced by more relevant soft skill courses.
2.2.2. N/A
2.2.3. The implementation of the study program pays special attention to the study-centered approach, which is a definite plus. Notably, it is credible that the study program is designed with the help of external, industrial players in order to satisfy the labor market demand for competent specialists. Various learning paths are available due to specialization, which is a further asset.
From a methodical point of view, the program applies various means of knowledge transfer, although - due to the student feedback - the development of state-of-the-art lab skills still needs to be better incorporated into everyday practice.
2.2.4. The study program has a clear description of internships through the two documents of Methodological Guidelines and Internship Regulations. These documents well cover all the necessary technical details of the organizational aspects of the internship, and it is clear these aspects are fully in line with the regulations. Regulations are the same for internship in Latvian and in English programme versions.
2.2.5. N/A
2.2.6. Topics for final thesis works can be chosen according to the relevant specialization, which is evidently positive. However, while several relevant topics are provided in the report on the specialization of Polymers and composite materials, the same does not hold for every specialization, especially not in the case of Conservation and Restoration. More attention should be paid to providing a sufficient variety of topics in each of the specializations.
As an overall critical remark, topics coming from real-world applications should be provided, potentially with a co-supervisor from the industry. This would help students to better understand how to apply academic knowledge in a project work already in their final year of studies.

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

The study program is fully in line with the requirements, and from many points of view, it is very well organized. As a definite plus, the study program is developed with the help of industrial partners, and their involvement is well reflected in the curriculum. However, the specializations are not equally well developed, neither from a curricular point of view nor from the viewpoint of thesis topics. Special attention must be paid to a wider selection of courses to develop relevant soft skills and transversal competencies.

Strengths
1. Well-thought-out structure of the curriculum
2. Clearly organized internship

Weaknesses
1. The selection of courses to develop soft skills is very limited
2. The specializations are not equally well developed

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

n/a

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The studies are mainly organized within the Faculty of Materials Science and Applied Chemistry and its instituts: Institute and Department of General Chemical Engineering, as well as Rudolfs Cimdins Riga Biomaterials Innovations and Development Center; Institute of Applied Chemistry and Department of Chemistry; Institute of Technology of Organic Chemistry and Department of Chemistry of Biologically Active Compounds; Institute of Polymer Materials, Polymer Testing Laboratory; Department of Polymer Materials Technology; Institute of Materials and Surface Engineering; Institute of Technical Physics and its organizational units.
The faculty with its institutes provides a wide spectrum of equipment which allows implementing of the study process in compliance with global trends and scaling up from laboratory to industrial production of certain new materials. There are available teaching stands, technological equipment for the acquisition and processing of new materials, and scientific-research equipment for the structure and functional properties of materials to study.
There is available equipment for study and research purposes at research partners' laboratories, including the research infrastructure of the National Research Center (https://www.cfi.lu.lv/petnieciba/projekti/vnpc/), as well as the clean rooms and transmission electron microscope for the acquisition of high added-value technologies. Certain technological equipment is also available from cooperation partners in the commercial sector - TENACHEM Ltd, MassPortal ltd, “Latvijas Finieris”, etc. (SAR 3.3.1.)
The scientific library of RTU provides the needed methodological and informative resources for this SP in both printed versions and e-resources. In the assessment period for the topic of “Material Sciences” - 33 books were purchased amounting to 3245,18 EUR by the scientific library; for “Physics, material science, mathematics and statistics” - 106 books were purchased amounting to 9023,18 EUR. (SAR pt. 2.3.3.) (More information in section 1.3.3.)
2.3.2. The funding available to the study program, funding sources, and the use of funding ensure full implementation of the study process, the study program has the minimum number of students to ensure the profitability of the study program (by separately indicating the different implementation options of the study program) and facilitates the development of the study program.
2.3.3. Tuition fee for the academic year of 2022/2023 is 2800 EUR per student, however, there were no enrolled students for a tuition fee. In the study year, 2021/2022 14 students were matriculated in the 20 available state-funded budget places. In that same study year, in the SP there were 22 students which is the lowest number in the assessment period, in 2013 there were 39 active students. Admission rates are very variable; however, the dropout is constantly very high in the first year. (SAR 3.3.3.)
During the assessment visit, in the meeting with the director of SP, it was mentioned that the minimum number of students to open a group is 5. The admissions are larger than the minimum number, however often after the first year the number of students drops under five, therefore there is a high risk of unprofitability. In the meeting with the teaching staff, this issue was also discussed. The teaching staff is also taking the initiative to work with very small groups by trying to merge them with other SP students, therefore forming bigger groups. Within the different meetings, the experts came to the conclusion that there is not sufficient marketing for this SP, many students are not well informed of the SP even at the start of it, and there is not sufficient information transferred to high schoolers about the field of material sciences and therefore lack of understanding of possible career possibilities.

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

The studies are implemented by the Faculty of Materials Science and Applied Chemistry and its instituts. The faculty with its institutes provide a wide spectrum of equipment and materials. There are possibilities to use the resources available at research partner laboratories and the commercial sector. The methodological and informative resources are accessible to students via ORTUS and are sufficient.
Admission rates are very variable, but in recent years not all available budget places are filled. The dropout is constantly very high in the first year. There is a high risk of unprofitability since the number of students every year among second-year students is below the minimum number mentioned by the SP director. More marketing has to be done to attract new students to this SP.

Strengths
1. There is a large variety (at least 100 units of different laboratory equipment) of equipment and materials available for practical classes and research both at the faculty and at the research and commercial sector partners.
2. There is a strong scientific library that offers the needed methodological and informative provisions.

Weaknesses
1. Admissions rates are very low (14 students per 20 available spots (in 2021)).
2. The dropout rate is high in the first year. (Out of admitted 18 students (in 2022) 4 continued their studies in the second year (2021))

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 material technical basis is sufficient. There are risks of unprofitability if the admissions are not increased.

2.4. Teaching Staff

Analysis

2.4.1. 46 staff members (13 professors, 10 assoc. prof., 8 assist. prof, 3 lecturers, 4 leading researchers, 4 researchers), 29 responsible instructors among them, are involved in the implementation of the study program “Materials engineering” (SAR, p. 182). Staff members holding academic positions are elected employees at RTU, whose scientific and pedagogical qualifications meet the regulations on criteria for assessment of a candidate’s scientific and pedagogical qualifications. The majority of staff members are certified experts of the Latvian Council of Science in the fields relevant to the field of study of the program under assessment. All members of the academic staff involved in the study program, including visiting lecturers, were selected according to their expertise and teaching & research on-the-job experience, which allows ensuring an efficient study process.
However, discussions with the industry representatives revealed that the interaction between academia and industry should be intensified in order to teach the students to possess the abilities and skills that meet the expectations of industrial partners.
2.4.2. At the moment, RTU is implementing the project of the European Social Fund SSO 8.2.2. “Strengthening of Riga Technical University academic staff in the fields of strategic specialization”,

where one of the tasks is to renew the academic staff in the fields of strategic specialization covering 10 study fields, including Materials Science.
Program management has developed a mechanism for teaching staff composition changes without /with negligible effect on the quality of the implementation of the study program. It focuses on the engagement of PhD and MSc students and young researchers in teaching activities as successors of elderly staff or as developers of courses with new content and new implementation modes. As evidenced by experience, a part of these young colleagues continues their work in research projects and over some time start building their academic career.
2.4.3. N/A
2.4.4. The academic qualification is awarded to the elected persons who fulfill the requirements set forth in the regulatory enactments and University regulations, thus elected persons to fulfill the requirements for publication automatically. It should be noted that the staff members have published 472 publications, 141 articles in journals, included in CAWoS or Scopus databases during the last 6 years, and also participated in >50 different research projects. (Provided data covers two programs: BSc in “Materials Engineering” and MSc in “Materials science and nanoengineering”).
2.4.5. Mutual cooperation mechanism for the teaching staff is established. There are regular meetings where program implementation-related problems (repetition and overlapping of course topics, support for the students having some knowledge gaps in previous courses, introduction of innovative teaching methods, etc) and also the issues related to the engagement of young colleagues and their involvement in study processes, including also preparation and delivering of the new courses, are discussed. The program syllabus and possible changes initiated by the staff, industry, or students that are aimed at the improvement of the program are discussed once a year.

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

The study program “Materials engineering” fulfills the requirements set by corresponding authorities and represents a well-established and well-functioning study program implemented by carefully selected highly qualified staff, who are experts in their fields and actively participate in scientific research and teaching. Promoting teachers’ career young researchers are involved in the development of new study courses and implementation of the whole study program.

Strengths
1. Implemented staff selection and exchange mechanism.
2. Implemented mechanism for the promotion of teacher’s career among young researchers.
3. Implemented mechanism for course content and whole program improvements.

Weaknesses
1. The interaction between academia and industry should be strengthened in order to teach/prepare graduates having abilities and skills that meet the expectations of industrial partners. This could be achieved by having at least one-half of the final degree thesis dedicated to the solution of industry-related problems.
2. Teaching staff mobility numbers are low (only 10 outgoing and 13 incoming mobilities during 6 years; provided for both: BSc SP “Materials Engineering” and MSc SP “Materials science and nanoengineering” in total)

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

RTU provided information indicating full teaching staff compliance with the conditions for the implementation of the study program and the requirements set out in the respective regulatory enactments.
However, it is not clear how visiting teaching staff is evaluated.

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 study program complies with the State Academic Education Standard or the Professional Higher Education Standard according to Annex in section 3.2

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

N/A

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

Descriptions of study courses and study materials are prepared in Latvian and English (Annex in section 3.2.). Study courses and studies materials are drawn up in accordance with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions.

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

Assessment of compliance: Fully compliant

Attached Sample of the diploma (Annex in section 3.1) complies with MK 16.04.2013. not. Nr.202 https://m.likumi.lv/doc.php?id=256157

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 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. according to annex in section 3.4

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: Fully compliant

According to provided AIP document Nr.1.10/09 in annex 3.1 the criteria is met.

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

N/A

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

In compliance according to the provided documentation in Annex in section 2.3

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

In compliance according to the provided documentation in Annex in section 2.3

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

As provided in Annex in section 2.1, in compliance with MK 23.01.2007. not. Nr.70
https://likumi.lv/ta/id/152072-studiju-liguma-obligati-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

Is confirmed as stated in Annexs in section 2.1

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

Is confirmed as stated in Annex in section 2.1

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

N/A

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

N/A

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 comply with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments

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

Study program “Materials engineering” fulfills the requirements set by corresponding authorities and represents a well-established and well-functioning study program implemented by carefully selected highly qualified staff, who are experts in their fields and actively participate in scientific research and teaching.
RTU has a great reputation in engineering. Also there are lots of academic staff who can provide high level lectures for students. RTU also has various laboratories for almost every aspect of material sciences, varying from simple laboratory equipment as scales and mixers and ending with state of the art spectrometers.
Special attention must be paid to a wider selection of courses to develop relevant soft skills and transversal competences.

Strengths:
No

Weaknesses:
1. to increase of number of students
2. future development of programmy also by inviting new industry partners and therefore improving the spectrum of areas study programme can cover.

Evaluation of the study programme "Materials Engineering"

Evaluation of the study programme:

Excellent

2.6. Recommendations for the Study Programme "Materials Engineering"

Short-term recommendations

Corresponding recommendations to the study field apply.

Long-term recommendations

1. Corresponding recommendations to the study field apply.

2. Attract more students for the study program and higher admissions.
3. Lower the dropout rates of students for the first year.

II - "Financial Engineering Mathematics" ASSESSMENT

II - "Financial Engineering Mathematics" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Compliance of the study programme to the study field is described in section 3.1.2. of the Self- evaluation report (page 94).
By evaluating supplied documents and obtained information during the Experts' visit it can be concluded that the study programme complies with the study field.
2.1.2. The title, code, the degree to be obtained, aims, objectives, learning outcomes and admission requirements are interrelated. The duration and scope of the study programme implementation, as well as the implementation language, are reasonable and justified.
2.1.3. It can be concluded that recommendations for the master study programme Financial Engineering Mathematics are implemented except recommendations regarding recommended literature (literature should not be older than 10 years) for study courses indicated in study course descriptions.
By examining study course descriptions, it is noted, that study course DIM704 includes a reference to books on numerical methods dated 2005, course DMS100 includes a reference to a book on the analysis of time series dated 1999, course DMS716 refer to the book on Mathematical physics methods dated by 1969.
2.1.4. Expert group appreciates that there is a constant need for experts in the respective field. It is also confirmed by students and graduates of the programme.
However, the number of students altho growing over the years is very low. According to provided data, the number of matriculated students reached 15 in 2020 and 2021. The number of graduates is below 10 (in 2021 it was 4).
RTU is trying to optimize the groups of students from two years in specific courses, which can improve the number of students within the group to about 20 max and allow to economically justify the existence of the programme.
2.1.5. N/A

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

The study program complies with all requirements.
The study program is justified in every aspect, however effort in experts' opinion must be made to increase the number of students, thus attracting more funding to the study program and also making the study process more interesting to the students.

Strengths
1. RTU has a good reputation.

Weaknesses
1. There is a very low number of students in the program.

2. There are no guest lecturers, which reduces the possibility to attract new lecturers from the industry.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. Based on the feedback of current and past students of the university, and based on the employment possibilities, the larger part of the curriculum should be devoted to actuarial/insurance studies. Currently only the theoretical background is provided in a general form - at least one course on specific actuarial studies should be incorporated into the curriculum.
In terms of soft skills, the curriculum must be improved. Currently, only a few soft skill courses are offered, among which two courses are on Presentation Skills, One of them can be eliminated, and substituted by other courses in soft skills. In general, a wider selection of courses dedicated to the development of soft skills should be provided in section B2 of the curriculum, but also in the free electives (section C). At the same time, the relevance of pedagogical studies is questionable.
A crucial problem is the overlaps of some topics in the Master courses with some topics in the relevant (Financial Engineering) Bachelor studies (for instance study courses DMS703 and DMS100). This evidently depends on the actual bachelor's degree, but for those who come from some very different Bachelor studies, some catch-up courses in the first year should be offered, in order to avoid unnecessary repetition of the Bachelor-level knowledge in the regular courses.
2.2.2. The degree awarded is correctly based on the relevant field of study, and the title of the degree well reflects the achieved learning outcomes of the students.
2.2.3. As a general comment, the theoretical background of the field is correctly covered and presented in the lectures and student-centered learning methods are applied.
However, a more practice-oriented approach is needed in those courses, where it is relevant. It is important to show examples where recent technologies about data science and algorithms and similar practical knowledge can be applied. Moreover, it is essentially important to provide this knowledge through real-life examples in these courses, which examples can potentially come from industrial partners and companies.
This also holds for the evaluation of the knowledge of students. Besides classical oral exams, practice-oriented tasks, and project-based evaluation methods could also be applied in those courses where it can be relevant.
2.2.4. N/A.
2.2.5. N/A
2.2.6. The topics offered for the final thesis well cover various aspects and subfields of the study program. However, just as in the practical phase, more “real life” topics and problems, potentially coming from industrial partners, should be offered for thesis topics. While most of the topics are about applications, they provide the academic view of applications, instead of the external view, with some exceptions, such as the Latvian insurance system - the selection of these good examples of topics should be widened.

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

The curriculum is overall suitable for achieving the required learning outcomes and scientific competencies. It is less so in the case of soft skills, where the curriculum provides a rather narrow selection of courses to develop these skills. This must be widened in the future. Besides the correctly covered theoretical aspects, more practice-oriented, real-life problems are required in the practices as well as in the final thesis topics offered. The same holds from a pedagogical point of view, especially in terms of evaluation methods: project works, the development of real-life problems

could be incorporated in a higher percentage of the pedagogical work.

Strengths
1. Good coverage of theoretical background.
2. Overall, the curriculum is fully compliant to the requirements.

Weaknesses
1. Narrow selection of courses to develop soft skills.
2. More practice-oriented, real-life problems are needed.

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 topics of the master's thesis and the research are based on important topics of the corresponding field. Academic staff and also industry partners contributes to the scientific achievements in the courses and study programme as such.

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. Studies are organized at the RTU campus Ķīpsala and implemented at the Faculty of Computer Science and Information Technology, where there are available modern classrooms and auditoriums with computers if those are needed for classes. (More information in section 1.3.2.) The students of this SP mentioned that one of the disadvantages was the old building in Meža street, however, this issue has been solved since the new faculty was opened at the campus and now all the classes are held there.
The scientific library of RTU provides the needed methodological and informative resources for this SP in both printed versions and e-resources. In the assessment period for the topic of “Financial Engineering,” 62 books were purchased amounting to 4180,46 EUR by the library. (More information in section 1.3.3.) The teaching staff pointed out that all the materials, slides, and instructions for practical work are placed in ORTUS and therefore always available for students.
2.3.2. N/A.
2.3.3. For the study year 2022/2023 there were 16 state-funded study places available, the fee for self-paid places was 3700 EUR per year, however, there are no students in the tuition-paying places. For the study year 2021/2022 there were admitted 15 students in state-funded budget places. During the assessment period, there is an increase in student numbers from 5 in 2017 to 15 in 2021. The number of graduates in this SP is quite low, with the highest number of students that have graduated in one year being 9 and the lowest - 2. (SAR 3.3.3.) Since the SP still is very recent then the numbers might even out later on. In the documents, it was mentioned that the minimum number of students to form a group is 19. The director of the SP explained that this number indicates the number for both study years summed together not each year. From the provided information, there are currently 22 active students (11 in 1st and 11 in 2nd year). This number is quite low and in case of students dropping out of the SP, there are risks of unprofitability. In the meeting with students, it was understood that not many students from the bachelor SP “Financial engineering” continue their studies at the master's level. The experts believe that this issue should be addressed by the university in the future to improve the rentability of this SP.

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

The study provision is sufficient for the implementation of the SP. Studies are held at a new and modern faculty building that offers classes with computers. The methodological and informative resources are accessible to students via ORTUS and are sufficient. During the assessment period, there is an increase in state-funded budget places. There is a low number of graduates, however, the SP is still new. At the given moment, there are 22 active students in this SP which is close to the minimum student number of students for the profitability of this SP. Not many students continue their studies in this SP from the bachelor's level.

Strengths
1. There is an increase in the number of students (from 5 in 2017 to 15 in 2021.).
2. The study process is held at the new and modern faculty building.

Weaknesses
1. There are no students in the tuition-paying places.
2. The number of students in the SP is quite low and in the case of dropping out, there are risks of unprofitability (22 active students (11 in 1st and 11 in 2nd year)).

Assessment of the requirement [6]

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

Assessment of compliance: Fully compliant

The resources are sufficient for the implementation of the SP. The finances are balanced, however in the case of larger dropout rate, there is risk of unprofitability.

2.4. Teaching Staff

Analysis

2.4.1. The qualification of teaching staff complies with the requirements set forth in the regulatory enactments. All 23 staff members are PhD holders (7 PhDs in Mathematics, 5 PhDs in Economics, 6 PhDs in Engineering, 1 PhD in Philology, 2 PhDs in Psychology, 2 PhDs in Pedagogy). Selection of teaching team members is based on each candidate’s expertise in the teaching subject and on-the-job teaching and research experience. Provided composition of staff members involved in the implementation of the study program complies with the requirements and is sufficient for the achievement of the aims and learning outcomes of the study program and the relevant study courses.
2.4.2. The composition of the academic staff involved in implementation has not been changed since licensing of the study program in 2017. Program management believes that the staff composition will be stable until the next accreditation. There are no plans regarding staff exchange.
2.4.3. N/A.
2.4.4. Since the majority of staff members are elected employees at RTU they fulfill the minimum requirements regarding research activities. However, there was no information related to staff participation in research activities provided in SAR. It should be noted that only 7 members of the teaching staff are active in research. Majority of publications – conference proceedings.
2.4.5. Mutual cooperation mechanism for the teaching staff is established. There are regular

meetings where program implementation-related problems (repetition and overlapping of course topics, support for the students having some knowledge gaps in previous courses, introduction of innovative teaching methods, etc.) are discussed. The program syllabus and possible changes initiated by the staff, industry, or students that are aimed at the improvement of the program are discussed once a year.

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

The study program “Financial engineering mathematics” temporarily fulfills the requirements set by corresponding authorities, however, according to provided information teaching staff members keep a passive position regarding scientific research work (projects and publications), which may cause serious eligibility problems for the study programs implementation.
Strengths
1. Criteria and mechanisms for staff selection are clearly defined.
2. Established mechanism for course content and program improvements.
Weaknesses
1. Passive participation of the teaching staff in research activities (only 7 of 23 are active). Majority of publications - conference proceedings. There were no research project activities provided.
2. Staff mobility is very low: only one person participated in outgoing mobility.

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

RTU provided information which indicates full teaching staff compliance with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.
There were no visiting 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

Complies to Cabinet Regulation No. 240 adopted on 13 May 2014 “Regulations on the State Academic Education Standards” (available only in Latvian: https://likumi.lv/doc.php?id=266187).

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

Assessment of compliance: Not relevant

N/A

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

Descriptions of study courses and study materials are prepared in Latvian and English (Annex in section 3.2.). Study courses and studies materials are drawn up in accordance with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions.

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

Assessment of compliance: Fully compliant

Attached Sample of the diploma (Annex in section 3.1) complies with MK 16.04.2013. not. Nr.202 https://m.likumi.lv/doc.php?id=256157

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

In compliance according to annex in section 3.4

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: Fully compliant

According to provided AIP document No. 1.12/64 in annex within section 3.1 the criteria is met.

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

N/A

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

In compliance according to the provided documentation in Annex in section 2.3

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

In compliance according to the provided documentation in Annex in section 2.3

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

As provided in Annex in section 2.1, in compliance with MK 23.01.2007. not. Nr.70
https://likumi.lv/ta/id/152072-studiju-liguma-obligati-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

Is confirmed as stated in Annex in section 2.1

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

Is confirmed as stated in Annex in section 2.1

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

N/A

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

N/A

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 comply with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments

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

Study programme is justified in every aspect, however, for future development, effort in experts opinion must be made to increase the number of students, thus attracting more funding to the study programme and also making the study process more interesting to the students.
The curriculum is overall suitable for achieving the required learning outcomes and scientific competences.
Even if their current achievement is assessed as meeting the needs of the study programme, for further improvement of the programme, eEffort must be made to ensure academic staff participation in research activities and producing high quality scientific articles, as well as participation in mobility programme.

Strengths:
1. The study process is held at the new and modern faculty building.
2. Overall, the curriculum is fully compliant to the requirements.

Weaknesses:
1. related more to the number of students and improvement of academic staff.

Evaluation of the study programme "Financial Engineering Mathematics"

Evaluation of the study programme:

Excellent

2.6. Recommendations for the Study Programme "Financial Engineering Mathematics"

Short-term recommendations

1. Corresponding recommendations to the study field apply.
2. Encourage each teaching staff member to publish at least 2 papers in the journals included in SCOPUS or CA WoS databases during the next accreditation period
3. Encourage each teaching staff member to participate in at least 1 mobility activity during the next accreditation period

Long-term recommendations

1. Corresponding recommendations to the study field apply.
2. The marketing of the SP should be increased - students should be addressed from the bachelor program “Financial engineering” to continue their studies in this master's program.

II - "Material Science and Nanotechnologies" ASSESSMENT

II - "Material Science and Nanotechnologies" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. of the study programme to the study field is described in section 3.1.2. of the Self-evaluation report (page 143).
By evaluating supplied documents and obtained information during the Experts' visit it can be concluded that the study programme complies with the study field.
2.1.2. The title, code, the degree to be obtained, aims, objectives, learning outcomes and admission requirements are interrelated. The duration and scope of the study programme implementation, as well as the implementation language, are reasonable and justified.
2.1.3. In general recommendations are taken into account. Some recommendations take a longer time period and activities are ongoing at the moment, for instance, activities related to the popularization of the study programs, including international cooperation and marketing activities.
In experts' opinion activities for improvement of the program should be continued and especially activities regarding the attraction of new students both national and international should be improved.

2.1.4. Graduates of the programme are very in demand at industry companies. Students often already have jobs in their respective areas during master's studies. It is confirmed by students and graduates of the programme.
However, despite the high demand for specialists, the number of students in particular in master's study programme are very low. According to the provided data, each year there are only about 10 matriculated students and about the same number of graduates.
Judging only by numbers, the existence of a study programme cannot be justified by economic reasons. However, RTU optimizes study courses by allowing students from both study years to take the same courses simultaneously, thus reaching the appropriate number of students in a single group.
RTU academic staff also are involved in research. It is indicated during the visit, that only about 10 % of the income of academic staff is related to teaching. Such an approach generates significant income for RTU to ensure the existence of a study programme and also provides academic staff with knowledge about the latest developments in the industry.
Overall study programme economically and socially is justification. However, actions must be taken to improve the dynamics of the number of students and employment indicators of the graduates of the study programme.
2.1.5. N/A.

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

The study program complies with all requirements.
The study program is justified in every aspect, however effort in experts' opinion must be made to increase the number of students, thus attracting more funding to the study program and also making the study process more interesting to the students.
It was also noted by stakeholders during the experts' visit, that in society there is no general understanding of what Materials sciences means, therefore leading to a very low number of students, despite the very high demand for specialists in this area.

Strengths
1. RTU has a great reputation in engineering. Also, there are lots of academic staff who can provide high-level lectures for students. RTU also has various laboratories for almost every aspect of material sciences, varying from simple laboratory equipment such as scales and mixers and ending with state-of-the-art spectrometers.

Weaknesses
1. Only a short list of industry partners can affect program development. There is no information and also there is no procedure in place, on how industry companies can get involved with RTU.
2. There is no general understanding in society of what Material sciences mean
3. There is a very low number of students in program

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The study program has been developed in accordance with the specific objective of the operational program "Growth and Employment" project "8.2.1. To reduce fragmentation of study programs and strengthen resource sharing" for defined goals and objectives, not only by reducing the fragmentation of study programs but also by updating the content of the study program and improving the quality of study courses.

The study program according to the classification of education and training sectors corresponds to code 526 with the transcript "Other engineering" (Cabinet Regulation No. 322 "Regulations regarding classification of education in Latvia"), which is the best available option in the thematic area of Education 52 "Engineering and Technology". On the other hand, the degree to be obtained is not directly subordinate to this classification, therefore the "Master of Engineering Degree in Materials Science and Nanotechnology" can be considered to correspond to the study program under consideration, especially since both materials sciences and nanotechnologies are particularly distinguished by their interdisciplinary nature. This is proved by the themes of many study courses included in the study program: they are created in physics, chemistry, biology, individual engineering, etc. subsectors, often linking these subsectors to technology. The titles of the study courses, and therefore the content, mention terms such as biopolymers, polymers, bioprocesses, biological systems, biomaterials, physics, laser technologies, photonics, chemistry, semiconductors, layers, coatings, ceramics, thin layers, fibrous materials, structures, composites, etc., often in combination with modifying words nano - and Materials.

In general, the planning of the study program is designed as a study program based on specializations (as opposed to general), and the approach that part of the compulsory study courses is different by area of specialization is distinguishable. Such a solution is better able to adapt to the demands of the economy in different sub-sectors and is also in line with trends in the European Education Area.

The mapping of study courses confirms that both the study program as a whole and individual fields of specialization achieve the intended results, the small differences between the directions are permissible and are related to differences in the topic of study fields.

The design and assembly of the study program with study courses, in general, is appropriate for achieving the set goal: to prepare critical thinking highly qualified specialists who are familiar with modern materials, new technologies, innovative approaches to material and process modeling, and are suitable for leading work in the fields of specialization of materials science and nanotechnology.

2.2.2. The degree awarded is correctly based on the relevant field of study, and the title of the degree well reflects the achieved learning outcomes of the students.

2.2.3. Evaluation of study results at RTU is sufficiently described in the Regulations for the Evaluation of Study Results and the By-law on Final Examinations. The choice of pedagogical methods, the structure of study courses, and assessment methods according to the specifics of higher education institutions shall be under the responsibility of the teaching staff responsible for the study courses, adapting to the specifics of the content of the study course and study program, as well as taking into account the needs of students. The implementation of the study program includes the principles of student-centered teaching.

The relevant information in the course descriptions is sufficient.

Forms of implementation of study courses include lectures, practical classes, laboratory work, internships in enterprises or scientific institutes, final work, as well as independent studies. Study courses, among other things, train both group work and provide for the development of individualized projects. The study program claims to encourage students to acquire critical thinking in solving various real-life problems, based on the implementation of the competence approach to achieve this goal.

2.2.4. During the on-site visit, several other employers confirmed to the experts their interest in providing internships for students in the study program. Representatives of employers also assured that companies are ready to provide internships for English-speaking students and are also interested in such students as potential future employees. In the future, it is desirable to conclude internship agreements also with foreign countries, primarily with companies from the nearest neighboring countries, ensuring a wider base of internships and greater internationalization.

Thus, it can be concluded that the conditions for the organization of internships and the support provided to students are defined and integrated into the content of the study program, but it is

desirable to expand the possibilities of providing internships.
2.2.5. N/A.
2.2.6. Final theses at the master's level are developed according to scientific topicalities in the directions of professional specialization of the program, and usually they are coordinated with the scientific and market-oriented projects implemented by the scientific institutions implementing the program, as well as the current problems of interested manufacturers.
The conformity of the topics of the final papers with scientific novelties is determined by the competence of those scientific managers who are certified by scientific publications, as well as participation in the implementation of scientific projects. On the other hand, the topicality of the topics of the final works in the labor market is evidenced by the fact that the works are developed in cooperation with employers on the topics of interest to them.

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

The content of the study program has been developed thoughtfully, in accordance with the current trends of the industry. Study courses within the framework of compulsory and limited electives of each specialization direction form a coherent system of courses, which are supplemented with general skills courses, internships and master's thesis.

Strengths
1. Logically structured study planning by compulsory, limited choice, free choice and practice categories.
2. The content of the study courses is current and mutually agreed within the framework of each specialization direction.
3. Opportunity to additionally study in courses of an interdisciplinary nature.
4. The interests of employers have been taken into account and a realistic solution has been found - practice in enterprises.

Weaknesses
1. In general, employer involvement is based on historical cooperation. There is a lack of new members from industries that would benefit from involvement in developing, maintaining and providing internship opportunities for a given 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 study program for obtaining a master's degree is based on the achievements and findings of the respective field of science or field of artistic creation

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The studies are mainly organized within the Faculty of Materials Science and Applied Chemistry and its institutes: Institute and Department of General Chemical Engineering, as well as Rudolfs Cimdins Riga Biomaterials Innovations and Development Center; Institute of Applied Chemistry and Department of Chemistry; Institute of Technology of Organic Chemistry and Department of Chemistry of Biologically Active Compounds; Institute of Polymer Materials, Polymer

Testing Laboratory; Department of Polymer Materials Technology; Institute of Materials and Surface Engineering; Institute of Technical Physics and its organizational units.
The faculty with its institutes provides a wide spectrum of equipment which allows implementing of the study process in compliance with global trends and scaling up from laboratory to industrial production of certain new materials.
There is available equipment for study and research purposes at research partners' laboratories, including the research infrastructure of the National Research Center (https://www.cfi.lu.lv/petnieciba/projekti/vnpc/), as well as the clean rooms and transmission electron microscope for the acquisition of high added-value technologies. Certain technological equipment is also available from cooperation partners in the commercial sector - TENACHEM Ltd, MassPortal ltd, “Latvijas Finieris”, etc. (SAR 3.3.1.)
The scientific library of RTU provides the needed methodological and informative resources for this SP in both printed version and e-resources. In the assessment period for the topic of “Material Sciences” - 33 books were purchased amounting to 3245,18 EUR by the scientific library.; “Physics, material science, mathematics and statistics” - 106 books were purchased amounting to 9023,18 EUR; “Material nanotechnologies” - 11 books were purchased amounting to 1597,54 EUR. (SAR pt. 2.3.3.) (More information in section 1.3.3.).
2.3.2. N/A.
2.3.3. Tuition fee for the academic year of 2022/2023 is 4200 EUR per student, however, there were no enrolled students for a tuition fee. In the study year, 2021/2022 7 students were matriculated in the 14 available state-funded budget places. In that same study year, in the SP there were 10 students which is the average number as it has been in the assessment period. Admission rates are quite low in the assessment period; however, it has to be taken into mind that this SP is new. (SAR 3.3.3.)
During the assessment visit, in the meeting with the director of SP, it was mentioned that the minimum number of students to open a group is 2, and even in some cases that it might be one student. Director mentioned that in many cases the teachers are willing to work individually with each student and if it is possible, then the study groups have some classes oscillating between years, therefore some students might have one SC in the first year, some might have in the second year together with the first-year students. In the meeting with the teaching staff, this issue was also discussed. The teaching staff is also taking the initiative to work with very small groups by trying to merge them with other SP students, therefore forming bigger groups. Within the different meetings, the experts came to the conclusion that there is not sufficient marketing for this SP, many students are not well informed of the SP even at the start of it, and there is not sufficient information transferred to school children about the field of material sciences and therefore lack of understanding of possible career possibilities. It was also brought up that not many students from the bachelor program “Material engineering” continue their studies at the master's level. The teachers themselves came to the conclusion that the “golden standard” to get students to continue their studies is to involve them in the research field during their bachelor studies.

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

The studies are implemented by the Faculty of Materials Science and Applied Chemistry and its instituts. The faculty with its institutes provide a wide spectrum of equipment and materials. There are possibilities to use the resources available at research partner laboratories and the commercial sector. The methodological and informative resources are accessible to students via ORTUS and are sufficient.

Admission rates are very low and in recent years not all available budget places are filled, but it has to be taken in mind that this SP is new and admissions in it are very recent. There is a high risk of unprofitability since the number of students has been quite low. More marketing has to be done to attract new students to this SP, especially among bachelor programs of “Material engineering”

Strengths
1. There is a large variety of equipment and materials available for practical classes and research both at the faculty and at the research and commercial sector partners.
2. There is a strong scientific library that offers the needed methodological and informative provisions.

Weaknesses
1. Admissions rates are very low.

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 material technical basis is sufficient. There are risks of unprofitability if the admissions are not increased.

2.4. Teaching Staff

Analysis

2.4.1. Study program “Material Science and Nanotechnologies' is implemented by 37 members of the academic staff (13 prof., 5 assoc. prof., 5 assist. prof., 1 lecturer, 7 leading researchers, 2 researchers); 21 of them are instructors responsible for course modules. The study program is implemented at the Material Science and Applied Chemistry, but also involves academic staff from other organizational units at RTU. Staff members holding academic positions are elected employees at RTU having qualifications relevant to the legal requirements for the teaching staff. The majority of staff members are certified experts of the Latvian Council of science in their fields of expertise. Apart from experienced members of the academic staff, the study program involves younger lecturers and researchers of the faculty, whose fields of activities and research are related to a wide range of subfields in materials science and nanotechnologies. All members of the academic staff involved in the study program have appropriate qualifications and experience to ensure an efficient study process.
However, the link between industry and academia as well as advantages of the on-the-job training, which is absolutely required in the labor market are not fully explored.
2.4.2. Well-functioning mechanism for the implementation of the actual changes of teaching staff without negative effect on the quality of implementation of the study program is established with a focus on young researchers or doctoral students as the potential future substitutes for older teachers or as the candidates for the development and implementation of the new advanced courses.
2.4.3. N/A.
2.4.4. The academic qualification is awarded to the elected persons who fulfill the requirements set forth in the regulatory enactments and University regulations, thus elected persons fulfill the requirements regarding scientific publications automatically. It should be noted that the staff

members published 472 publications, incl. 141 papers in journals indexed in CA WoS and Scopus databases during the last 6 years and also participated in >50 different research projects (Provided data covers two programs: BSc in “Materials Engineering” and MSc in “Materials science and nanoengineering”).
2.4.5. There is a mechanism promoting mutual cooperation between academic staff working in the study program, which ensures improvement and integration of the study courses.
Regular meetings of the teaching staff are organized for the course/ program reviewing and updating takes place. During these meetings curricula of the study courses are discussed in order to renew course information according to requests from industry and from students, to avoid overlapping or repetition of the content of similar courses provided for BSc and MSc students, or to identify knowledge gaps from previous courses. Young teachers/researchers participating in these discussions are gaining experience in course construction and program implementation. The program itself is discussed once per year.

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

The study program “Material science and nanotechnologies” implementers fulfill legal requirements set for the staff members' qualification and for the quality of the staff composition which is requested for the achievement of the study program goals and successful implementation of the study program in total. Despite the program quality and highly qualified teaching staff, the program itself is not very popular among BSc graduates, indicating possible program profitability issues in the future.

Strengths
1. Implemented staff selection and exchange mechanism.
2. Implemented mechanism for the promotion of teacher’s career among young researchers.
3. Implemented mechanism for course content and whole program improvements

Weaknesses
1. Weak interaction between program implementing staff and industry. Only very few Master Theses were dedicated to the solution of Industry born problems.
2. Low mobility of the staff in both directions (10 outgoing staff mobilities and 13 incoming mobilities).

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

RTU provided information which indicates full compliance of the teaching staff with the the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.
There was no information provided regarding assessment of the external teaching staff.

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

Study programme complies to Cabinet Regulation No. 240 adopted on 13 May 2014 "Regulations on the State Academic Education Standards" (available only in Latvian: https://likumi.lv/doc.php?id=266187).

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

Assessment of compliance: Not relevant

N/A

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

Descriptions of study courses and study materials are prepared in Latvian and English (Annex in section 3.2.). Study courses and studies materials are drawn up in accordance with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions.

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

Assessment of compliance: Fully compliant

Attached Sample of the diploma (Annex in section 3.1) complies with MK 16.04.2013. not. Nr.202 https://m.likumi.lv/doc.php?id=256157

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

In compliance according to annex in section 3.4

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: Fully compliant

According to provided AIP document No. 1.10/52 in annex within section 3.1 the criteria is met.

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

N/A

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

In compliance according to the provided documentation in Annex in section 2.3

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

In compliance according to the provided documentation in Annex in section 2.3

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

As provided in Annex in section 2.1, in compliance with MK 23.01.2007. not. Nr.70
https://likumi.lv/ta/id/152072-studiju-liguma-obligati-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

Is confirmed as stated in Annex in section 2.1

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

Is confirmed as stated in Annex in section 2.1

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

N/A

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

N/A

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 comply with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments

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

Study programme is justified in every aspect. Admission rates are very low and in recent years not all available budget places are filled, but it has to be taken in mind that this SP is new and admissions in it are very recent. More marketing has to be done to attract new students to this SP, especially among bachelor program of “Material engineering”.
RTU has a great reputation in engineering. Also, there are lots of academic staff who can provide high level lectures for students.
The content of the study program has been developed thoughtfully, in accordance with the current trends of the industry. Weak interaction between programme implementing staff and industry were noticed. There is no information and also there is no procedure in place, how industry companies can get involved with RTU. Only very few Master Theses were dedicated to the solution of Industry born problems.
Otherwise such weaknesses were identified, which must be improved in general and are more focused on further improvement rather than on the elimination of significant shortcomings. For example, Experts were convinced that the RTU study program financing procedure, even with a low number of students, allows to ensure a successful study process. During the assessment process attention was paid to cooperation with industry companies, experts concluded, that there is a list of companies who work with RTU, and for others there is no visible way to participate. But on the other hand, the ones who are involved with RTU really work with the university, provide study processes with samples for research, give guest lectures etc. The fact that there is no visible way for others to get involved is something to improve, but the programme as it is now can be evaluated as Excellent.,
However more efforts are required to increase the number of students, thus attracting more funding to the study programme and also making the study process more interesting to the students.

Strengths:
1. RTU has various laboratories for almost every aspect of material sciences, varying from simple laboratory equipment such as scales and mixers and ending with state-of-the-art spectrometers.
2. The content of the study courses is current and mutually agreed within the framework of each specialization direction.

Weaknesses:
1. increasing number of students.
2. improving study programme by inviting new industry partners, therefore widening the range of topics covered in the programme.

Evaluation of the study programme "Material Science and Nanotechnologies"

Evaluation of the study programme:

Excellent

2.6. Recommendations for the Study Programme "Material Science and Nanotechnologies"

Short-term recommendations

Corresponding recommendations to the study field apply.

Long-term recommendations

Corresponding recommendations to the study field apply.

II - "Particle Physics and Accelerator Technologies" ASSESSMENT

II - "Particle Physics and Accelerator Technologies" ASSESSMENT

2.1. Indicators Describing the Study Programme

Analysis

2.1.1. Compliance of the study programme to the study field is described in section 3.1.2. Of the Self-evaluation report (page 196).
By evaluating supplied documents and obtained information during the Experts' visit it can be concluded that the study programme complies with the study field.
However, Experts' opinions indicated objective to provide opportunities otherwise unavailable in Latvia for research in high-energy physics and accelerator technologies, thereby providing a counterweight to the brain drain from the country is questionable, since the nature of the study programme suggests any kind of invites potential graduates find jobs outside Latvia, where particle physics and acceleration technologies are used in industry.
2.1.2. The title, code, the degree to be obtained, aims, objectives, learning outcomes and admission requirements are interrelated. The duration and scope of the study programme implementation (including different study programme implementation options), as well as the implementation language, are reasonable and justified.
2.1.3. No changes in the parameters of the study programme have been made so far.
It was recommended (short-term recommendation) by experts that until the start of the study implementation, the study course must be supplemented with newer literature sources in the respective fields.
The recommendation is not implemented; in fact, it was refused to do so according to provided information. Although experts agree that there can be science areas, where some books dated several decades ago are still used daily and considered gold-standard teaching materials, such books cannot make the whole used literature range for the study course. To keep the study course and study programme on the cutting edge of the study field, also used teaching materials (including used literature) must be the latest and newest in the respective scientific area.
Also, a long-term recommendation was recommended to develop an appropriate master's study program for attracting graduates and preparing them for studies at the doctoral level. Implementation of the study programme is planned for autumn 2025.
Other recommendations are implemented.
2.1.4. The implementation of the study programme started in the autumn semester of 2021. According to the provided data, there are seven students enrolled.
Since the programme is quite new, it is not possible to evaluate student dynamics, however, the number of students enrolled for the doctoral programme is quite good, especially considering the programme's nature.
Also considering the programme's nature, it is most probable that graduates will either find their jobs abroad or stay in university as academic staff since at the moment respective industries in

Latvia are not developed.
2.1.5. As it was explained during the experts' visit, the doctoral programme is developed within a larger project involving CERN Baltic Group. The involvement of both universities was rather a political decision than practical, that being said, both universities can provide high-grade experts and resources for programme development.
There is no doubt that both involved universities (RTU and LU) can ensure a high-quality study process.
From point of view of the popularization of the study programme and its internationalization of it, it might make sense to involve universities from other countries, for instance, University of Tartu, Estonia, which is also part of the project mentioned above and can provide to the students' international experience during study process and the possibility to do research and academic work also in other countries.

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

The study program complies with all the requirements as such, however, effort must be made to improve study courses regarding used literature. As explained by the academic staff of the programme, CERN library is available for the research and study processes containing the latest books and scientific articles. There should not be a problem finding the necessary materials for the study courses. Arguments that only golden standard books dated several decades ago are used cannot be considered as valid, especially in a such doctoral programme.
It is confusing that the university uses two terms - academic staff and responsible academic staff in the study course description. It is not obvious then who is the actual professor who delivers the study course. If necessary, it can be indicated that programme directors approve course content, but study course professors must be clearly indicated to avoid any misunderstandings.
Some study courses cannot be considered as doctoral level courses, for instance, HEP013, HEP015 or LUK002. The last of courses are provided by Latvia University and therefore partly out of the scope of this assessment, however, RTU should request partner universities to provide doctoral-level study courses with a corresponding scientific level of content.
Study courses HEP013 and HEP015 no doubt are great courses but cannot be used as part of the doctoral programme. If needed, they can be provided as additional learning options for doctoral students outside the programme. Also noted that HEP013 contains recommended literature in Russian which is not a language of the study programme.

Strengths
1. Both universities have resources either academic or financial to ensure high quality of realization of the study programme;
2. Cooperation with CERN gives additional aspects to program both by resources and also international recognition;
Weaknesses
1. Study course descriptions are misleading and must be improved
2. Study courses are not up to date with respect to used literature
3. Partner universities do not provide all the courses at the level of doctoral studies
4. Some of the courses should be either replaced or future developed to reach the doctoral study level
5. Some of the used literature sources are not in the language of the study program

6. Both Universities involved in the realization of the study program are from Latvia.
7. The industry of particle physics and accelerator technologies are not developed in Latvia
8. There is no master's program available, to ensure a seamless transition to the doctoral program.

2.2. The Content of Studies and Implementation Thereof

Analysis

2.2.1. The program and the total duration of study are the same for students with different acquired previous education. It is envisaged that studies can be completed expeditiously, but not earlier than three and a half years after the start of studies. The content of the joint doctoral study programme "Particle Physics and Accelerator Technologies" (PPAT) is topical and corresponds to the development trends of scientific fields both in Europe and in the world. The content of study courses in general ensures the achievement of the results of the study programme. Attendance of all lecture courses is scheduled for the first year of studies, with the rest of the study time being devoted mainly to research work. Study courses are taught at Riga Technical University (RTU) and the University of Latvia (LU).
The study program will be implemented in Latvian and English or only in English. The main language of the intended instruction of the study program is English, thus, in order to provide students with the necessary level of English, the content of the PPAT free elective courses (part C - in the amount of at least 6 KP) includes English language courses, for example, a special English course in the amount of 2 CP.
Some of the leading researchers in particle physics have participated in the creation of the program, as well as leaders in the field are involved in the development and teaching of courses, so there are no concerns about non-modern or outdated sources of information. The compulsory and limited elective courses offered by the study programme are up-to-date and fully cover the necessary theoretical knowledge base to be acquired. Most of the studies consist of independent scientific and research work in high-energy physics and/or accelerator technologies – 150 CP, t.sk, publications, reports at conferences, internships in an appropriate scientific center, such as CERN, as well as development of a doctoral thesis. Each study course focuses on the development of knowledge, skills and competences.
The courses offered are comprehensive, relevant and fully sufficient to be able to provide students with all the necessary knowledge, competences and skills in the development of a doctoral thesis and obtaining a scientific doctoral degree, as well as to become a highly qualified workforce after graduation. However, there are some courses on bachelor’s level included.
2.2.2. The degree awarded is correctly based on the relevant field of study, and the title of the degree well reflects on the achieved learning outcomes of the students.
2.2.3. The mechanism for the implementation of the study program is developed in detail, ensures the achievement of study results, observing the principles of student-centered learning, both by teaching study courses and supporting the student's research thesis and the development of a doctoral thesis. Students are offered a wide range of restricted and elective courses, thus providing an opportunity to adapt the content of the program to their own interests and needs. Students will be encouraged to actively participate in the improvement of the study process. Pedagogical methods, structure of study courses and assessment methods are selected by the teaching staff responsible for the study course, according to the specifics of the course content and program, as well as the needs of students.
The running of the study program is overseen and regulated by the study program council, with representatives from RTU, LU, CERN and the CERN Baltic group. The council ensures that the two partner universities are implementing the study program in a cohesive manner both in terms of the

study courses and the evaluation of the student's research performance.
The implementation of the study programme and examination and assessment of students will take place in accordance with the RTU and LU assessment regulations, which are in accordance with the Law on Higher Education Institutions of the Republic of Latvia.
2.2.4. As part of the implementation of this PPAT, a long-term internship at an appropriate scientific research center, such as CERN, is provided for students at the place of internship. During the on-site visit, it was mentioned that doctoral students can also choose other scientific research centers, however, cern is preferable due to its importance in the field of world particle physics. During the internship at CERN, students will be given the opportunity to participate in an appropriate research experiment and/or group, such as a CMS experiment. Cooperation with highly qualified researchers provides opportunities to acquire additional knowledge and acquire additional skills and competences, as well as to obtain contacts that would be useful for the development of a further research career.
The optimal time spent on a long-term business trip is from 12 to 24 months, in the second or third year of study. In the event that a student is unable to go on a long-term business trip for justifiable reasons, negotiations are carried out with the supervisor of the doctoral thesis, finding opportunities to continue studies in Latvia.
2.2.5. The implementation of the PPAT takes place in close cooperation with the supervisor of the doctoral thesis - the student is provided with independent access to his supervisor, in person, remotely or electronically. At least once a month, an organized student-leader meeting is mandatory, during which the student's accomplishments, problems that have arisen and opportunities for overcoming them, as well as the strategy of further research work are discussed, thus contributing to the achievement of the maximum possible excellence in research work. The doctoral student's thesis is evaluated annually in the programme council, the sectoral doctoral council or at a meeting of the doctoral council, which decides on the attestation for the next year, the preservation of the study form or the completion of studies in accordance with the doctoral regulations of both higher education institutions. The doctoral thesis will take place in accordance with the procedures specified in regulatory enactments, attracting at least two representatives from CERN and CERN Baltic Group to the Promotion Council.
2.2.6. This study programme is in its initial years and a description of the analysis and evaluation of topics of graduation papers is not yet available.

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

The content of the PPAT is up-to-date and corresponds to the development trends of scientific fields both in Europe and globally. The mechanism for the implementation of the study program is developed in detail, ensuring the achievement of study results and the principles of student-centered learning. The courses offered are comprehensive, relevant and fully sufficient to be able to provide students with all the necessary knowledge, competences and skills in the development of a doctoral thesis and a doctoral degree in physics and astronomy or a Doctor of Science in mechanical engineering and mechanics, as well as to become a highly qualified workforce after graduation.

Strengths
1. Broad choices on complementary study courses to fill in the gaps for master graduate students coming from different study fields.
2. Establishment of an independent study programme council and attraction of qualified experts in the field for the supervision and improvement of the study process.
3. The study program is unique in Baltic states ensuring study opportunities for a given study field in Latvia.

Weaknesses
1. There is no dedicated study program in Master studies that would prepare students for Doctoral studies in a given field.

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 study programme for obtaining a doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation

2.3. Resources and Provision of the Study Programme

Analysis

2.3.1. The study process of the study program is ensured by RTU and LU in close cooperation with CERN Baltic Group, as well as with the support of CERN itself.
In the SP, the matriculation of doctoral students takes place at RTU, LU includes these students in the register of students on their side. All students in this program have access to the informative and methodological supplies of both universities provided to students matriculated at each individual university. (SAR 3.3.1.)
A very advantage to this SP is their cooperation with CERN, which allows students to use all the equipment, and resources and have access to available systems at CERN. In the high energy physics specialization, students join one of CERN experiments with Latvia's involvement, currently, CMS or AEgIS. The student has access to the infrastructure of the respective experiment, as well as the full dataset of this experiment. Students of the accelerator technologies specialization are involved in accelerator technology projects related to CERN and get the opportunity to conduct research activities, using CERN laboratory infrastructure and software, like, for instance, CATIA computer modeling programs. All students get a CERN User status and are assigned a CERN IT account, incl. CERN e-mail. With these data, students are provided access to different IT resources and applications, including the professional version of the ZOOM video conference platform. Finally, all students have access to a huge amount of knowledge from human resources and the CERN scientific library. (SAR 2.3.2.)
The scientific library of RTU provides the needed methodological and informative resources for this SP in both printed versions and e-resources. Students also have access to LU-available materials from their library and e-resources. (More information in section 1.3.3.)
In the meeting with the students of this SP, it was confirmed that there are sufficient resources, and their mentors are willing to help at any step of the way. During the meeting with the SP directors from both universities, it was clarified that students receive login data from both universities and therefore can access all the information on both sides.
2.3.2. The scientific database CERN Document Server is available for doctoral students, including abstracts, conference presentations, and similar publications available to CERN, as well as access to CERN's scientific library. The students involved in the program have full access to the relevant CERN experiments and their data, as well as communication tools to connect to other experts.
Since this is a joint SP with LU, then students have access to both universities' laboratories, equipment, and informative and methodological basis. (SAR 3.3.2.)
2.3.3. To provide the funds necessary for the implementation of the study program Particle Physics and Accelerator Technologies, RTU uses state budget funding from the Ministry of Education and

Science, which is EUR 9300 for full-time intramural studies for the academic year 2021/2022. The tuition fee has been selected to the same amount - EUR 9300 per year. The tuition fee is the same for foreign students.
An agreement is concluded every year between RTU and LU on the fee for each credit point. Obtainable funding for study places financed from the state budget is determined proportionally to the number of credit points according to the study plan of the Program, applying to each study course the study cost coefficient of the thematic field of education with the minimum value, and the number of students at the beginning of the academic year.
The calculations for the place exceed the state funding amount, however, in the meeting with the SP directors, it was discussed and clarified that these are the calculations made in 2020, and the costs have been reduced and planned so that the finances are balanced.

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

The study process of the study program is ensured by RTU and LU in close cooperation with CERN Baltic Group, as well as with the support of CERN itself. The students have access to all the mentioned institutions' informative, material and technical resources. The financial aspects are planned between both universities by providing the funding regarding the study course credit point amount and its coefficient. The finances are balanced.

Strengths
1. Students have access to not only RTU and LU material-technical support, but also CERN itself and its Baltic group.
2. Students have access to relevant experiments and their data at CERN.
3. Students have access to all the e-resources in both universities.

Weaknesses
1. The expenses calculated for this study program exceeded the available funding provided by the state.

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 material technical provision is sufficient. The financial situation was calculated to be exceeding provided funding from the state, however the SP directors confirmed that the actual costs were balanced.

2.4. Teaching Staff

Analysis

2.4.1. Highly qualified teaching staff from LU and RTU, as well as attracted external experts from CERN and CERN Baltic Group, are involved in the implementation of the joint study program "particle physics and accelerator technologies. 7 members of teaching staff participate in the implementation of the study program from RTU, all of whom have been elected to the positions of professor (3), associate professor (1), docent/lecturer (2), as well as a leading researcher (1) (pls.

see RIGA TECHNICAL UNIVERSITY REGULATIONS ON THE PROCEDURE FOR ELECTION OF DOCENTS, LECTURERS, AND ASSISTANTS (Approved at the Meeting of RTU Senate on 27 April 2015 (Minutes No 589), with an amendment by the Resolutions of RTU Senate Meeting on 31 May 2021 (Minutes No 650)).
The qualifications of the teaching staff comply with the requirements set for the implementation of the study program and the requirements set forth in the regulatory enactments. The teaching staff is composed of researchers who are conducting research in the field of high energy particle physics, including world-class teacher/ researcher Prof Yuri Dokshitzer or are involved in projects aimed at the development of particle accelerator technologies (Latvian primary expert in Accelerator technology prof. Toms Torims, who is a study program director from RTU). A significant role in the implementation of the study program plays invited lecturers from CERN.
2.4.2. The implementation of the study program started in 2021. Following discussions with the program director during the visit, there are no plans for staff exchange. However, according to the expert's opinion staff planning is one of the strategic issues when thinking about the implementation/progress/quality of the program in the future (ps. also see REGULATIONS OF THE COMMITTEE OF STUDY DIRECTION, adopted pursuant to Part One of Section 15 of the Law on Higher Education Institutions, Approved by RTU Senate on 26 April 2021 (Minutes No. 649)
2.4.3. Provided list of representative publications (37) of RTU staff implementing this program together with a list of research projects (21 in total, not all related to the doctoral program) with the participation of the RTU staff (pls. see ANNEX "List of representative publications of the doctoral study program “Particle Physics and Accelerator Technology”) indicates potential for implementation of this high-quality doctoral study program. However, it would be wise to provide a separate list of research activities (publications and research projects) of the teaching staff involved in the doctoral program.
2.4.4. Information provided in SAR is not consistent, however, all members of the RTU teaching staff participating in the implementation of the program are elected employees at RTU (pls see RIGA TECHNICAL UNIVERSITY REGULATIONS ON THE PROCEDURE FOR ELECTION OF DOCENTS, LECTURERS, AND ASSISTANTS (Approved at the Meeting of RTU Senate on 27 April 2015 (Minutes No 589), with an amendment by the Resolutions of RTU Senate Meeting on 31 May 2021 (Minutes No 650)), which automatically indicates compliance with the requirements. It is not clear whether these requirements are applied to visiting staff and guest lecturers.
2.4.5. The study program was developed by a working group with the participation of experts from CERN Latvia Stakeholders group, which includes the representatives of Latvian industry and the Latvian Industrial Liaison officer (ILO) to CERN. Baltic Scientific Instruments (BSI) also are involved in development of this study programme as well as planned master’s programme. However, more broader involvement of industry must be encouraged in order to shape programme according to the needs and expectations of local industries.

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

Highly qualified LU and RTU teaching staff - experts in the research field, together with the visiting staff are participating in the implementation of the doctoral study programme “Particle physics and accelerator technologies”. Joint study program implementers fulfill legal requirements set for the

staff members qualification and for the quality of the staff composition which is requested for the achievement of the study program goals and successful implementation of study program in total. However, it should be noted that there is now information provided regarding guest lecturers from CERN or other institutions, who are giving lectures and seminars.
Programme itself has a potential for growth and development with a focus on the preparation of highly qualified researchers and widening of studies linked research areas for the staff. The doctoral program and teaching staff would benefit from the establishment of the relevant MSc study program.

Strengths
1. Highly qualified and motivated teaching staff composed of research experts.
2. Participation of visiting staff in the program implementation process.
3. Support from CERN Baltic group and CERN.
Weaknesses
1. Low interaction of programme developers and implementers with the local industry representatives.

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

It is not clear whether the requirements applied for elected staff are the same for visiting staff and guest lecturers.
Experts noticed that for academic staff there is strict criteria and all of them must be elected and comply to the all criteria of the elected academic staff. On the other hand in this particular programme there is invited lecturers to whom seems that rules do not apply. Sometimes it is not even clear who provide specific lectures. Therefore Experts considered this criteria as partly compliant.

2.5. Assessment of the Compliance

Requirements

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

Assessment of compliance: Not relevant

N/A

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

N/A

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

Descriptions of study courses and study materials are prepared in Latvian and English (Annex in section 3.2.). Study courses and studies materials are drawn up in accordance with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions. However, some bachelor's level modules are included in the program.

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

Attached Sample of the diploma (Annex in section 3.1) complies with MK 16.04.2013. not. Nr.202 https://m.likumi.lv/doc.php?id=256157

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: Partially compliant

National academic staff is in compliance with the requirements according to annex in section 3.4, however there is no information provided how the guest lecturers are selected and assessed.
Case is, that for other programmes there are strict rules, how one can become lecturer in a particular programme - there are requirements for education level, number of publications, participation in projects etc. However for Doctoral programme there are no such rules. In fact it is hard to understand who is actually delivering lectures, therefore rulings must be set, who can deliver lectures in a programme and clear information must be available on who is the actual lecturer for each study course.

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: Fully compliant

According to provided AIP document No. 1.10/10 in annex within section 3.1 the criteria is met.

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

In compliance according to the provided documentation in Annex in section 3.4

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

In compliance according to the provided documentation in Annex in section 2.3

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

Assessment of compliance: Fully compliant

The 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).

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

As provided in Annex in section 2.1, in compliance with MK 23.01.2007. not. Nr.70 https://likumi.lv/ta/id/152072-studiju-liguma-obligati-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

Is confirmed as stated in Annex in section 2.1

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

Is confirmed as stated in Annex in section 2.1

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

In compliance according to the provided documentation in Annex in section 3.1

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

N/A

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

Study programme partially comply with the requirements set forth in the Law on Higher

Education Institutions and other regulatory enactments. Some BSc level courses are included into the programme.

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

The study program is a joint program between Riga Technical University (RTU) and the University of Latvia (LU). The study process of the study program is ensured by RTU and LU in close cooperation with CERN Baltic Group, as well as with the support of CERN itself.
Both universities have resources either academic or financial to ensure the high quality of realization of the study program. Cooperation with CERN gives additional aspects to the program both by resources and also international recognition.
The students have access to all the mentioned institutions' informative, material and technical resources.
The program itself has a potential for growth and development with a focus on the preparation of highly qualified researchers and the widening of studies-linked research areas for the staff. The doctoral program and teaching staff would benefit from the establishment of the relevant MSc study program.
There are some weaknesses, that must be solved before the study program can be accredited, namely: doctoral level must be ensured for all the study courses (BSc level courses should not be included); recommended literature for study courses must be relevant; selection and evaluation procedure of external lecturers must be clarified; the owners of study modules should be also teachers, delivering lectures in the field.
For improvement, RTU should think about harmonizing the study environment, ensuring that teaching staff use the Moodle environment more equally, and a common procedure for using Moodle should be introduced, so that different interpretations do not arise. However, the findings do not affect the evaluation of the study program provided by the experts in a negative direction.

Strengths:
No.

Weaknessess:
1.doctoral level must be ensured for all the study courses (BSc level courses should not be included);
2. recommended literature for study courses must be relevant;
3. selection and evaluation procedure of external lecturers must be clarified;
4. the owners of study modules should be also teachers, delivering lectures in the field.

Evaluation of the study programme "Particle Physics and Accelerator Technologies"

Evaluation of the study programme:

Good

2.6. Recommendations for the Study Programme "Particle Physics and Accelerator Technologies"

Short-term recommendations

1. Corresponding recommendations to the study field apply.

2. Study course description forms should be improved, so it is clearly understandable who is actually delivering the study course.
3. Literature resources of study courses should be updated with the latest literature in the respective field of science. References to the literature resources in Russian should be removed.
4. It must be ensured that all the courses of study programme correspond to the doctoral study level.
5. Justification of involvement and criteria for external lecturers should be provided
6. Learning management system should be used during the study process, such as ORTUS or similar.

Long-term recommendations

1. Corresponding recommendations to the study field apply.
2. All teaching staff must have at least B2 level of English.
3. It is highly recommended to develop a master study programme, to ensure seamless transition to the doctoral programme. Such programme can provide all the necessary background for the students to study in a doctoral programme. It is also highly recommended to develop a study programme as a joint study programme with partner universities outside Latvia, thus attracting more international students to RTU and thus also to the doctoral programme.
4. The expenses calculated for this study program exceeded the available funding provided by the state. Sustainability of study programme must be evaluated.

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 ensure continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system

Requirements	Requirement Evaluation			Comment
R2 - Compliance of scientific research and artistic creation with the level of development of scientific research and artistic creation (if applicable)	Fully compliant			According to provided information, scientific research related to the study field “Physics, Material Science, Mathematics, and Statistics” is fully compliant with the level of development of scientific research
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			Cooperation of RTU with Latvian and foreign institutions in the study field in Experts' opinion is adequate to fulfill the requirements and to achieve the aims of the study field. Assessing study programmes it was noticed that in some cases employer involvement is based on historical cooperation and there is a lack of new members from industries that would benefit from involvement in developing, maintaining, and providing internship opportunities. In Experts opinion there is more or less closed circle of companies, who cooperates and it is quite difficult for new companies to enter the circle. To assure that cooperation remains relevant, for further development RTU should involve more companies from different areas of industry.
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		Elimination of deficiencies and shortcomings identified in the previous assessment of the study field are done, with exception to ones related to involvement of industrial partners and improvement of pedagogical skills of academic staff. Information on implementation of the recommendations was provided.

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	Financial Engineering (42460)	Not relevant	Fully compliant	Fully compliant	Partially compliant	Excellent
2	Materials Engineering (43526)	Not relevant	Fully compliant	Fully compliant	Fully compliant	Excellent
3	Financial Engineering Mathematics (45460)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Excellent
4	Material Science and Nanotechnologies (45526)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Excellent
5	Particle Physics and Accelerator Technologies (51443)	Fully compliant	Fully compliant	Partially compliant	Partially compliant	Good

The Dissenting Opinions of the Experts

No Dissenting Opinions