

# Expert group joint opinion

Evaluation Procedure: Assessment of Study Field

Higher Education Institution: Riga Technical University

Study field: Power Industry, Electrical Engineering, and Electrical Technologies

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# Summary Assessment of the Study Field

## Summary Assessment of the Study Field

The expert group has spent time studying self-assessment report submitted by Riga Technical University (RTU), that contained necessary formal information for assessment of study field Power Industry, Electrical Engineering, and Electrical Technologies including evaluation of the following study programmes: Professional bachelor study programme Adaptronics, Professional master study programme Adaptronics, Professional bachelor study programme Computerised Control of Electrical Technologies, Professional master study programme Computerised Control of Electrical Technologies, Doctoral study programme Computerised Control of Electrical Technologies, Professional master study programme Smart Power Systems, Doctoral study programme Smart Power Systems. It also contains information concerned with vision, mission, objectives, development, realization means and Quality assessment of programmes and study field of RTU. The expert group also had the opportunity to visit the premises of RTU. There was a chance to assess the infrastructure and equipment for study process and research and development (R&D) activities including lecture rooms, laboratories, workshops. The meetings and discussions with management of RTU, director of study field and directors of programmes, with academic staff, graduates and students of programmes, with employers were constructive, informative and straightforward.

The expert group has the impression that RTU is deservedly considered as the leading centre of higher engineering education and science in Latvia. The expert group appreciates the welcoming and benevolent atmosphere, willingness to improve programmes, R&D infrastructure and existing procedures.

The overall impression.

The expert group got in general positive impression concerned with organization of studies, R&D both at the level of RTU, Study field and programmes. The infrastructure and equipment for study and R&D are in accordance with modern level. Informational resources (library and its databases, ORTUS and MOODLE systems) ensure qualified informational support. Management and academic staff were competent and professional during discussions. Graduates and students were frank and competent during discussions.

The expert group from different points of view is also confident in ability of management and academic staff to ensure the sustainability of study field and programmes development.

The good cooperation with Latvian and International companies, good established relations with foreign partners, active participation in different funded projects also ensure additional financial resources for development.

Positive aspects.

The expert group had gone through discussions and inspection on site and would like to emphasize that highly motivated and competent faculty staff along with well developed infrastructure can provide a strong motivation to students and professionals.

The expert group has a joint opinion about synergy of study process and industry requirements in RTU, which serves as an attractor for students and potentially ensures the high quality of studies and gives the impulse for innovations.

The existing Quality assurance practices including regular surveys serve for improvement of overall quality of management and staff and RTU policies.

There is the good practice of different internal and external skills development courses, exchange opportunities for staff in RTU.

There is the good practice of providing for students extra services in sport and entertainment.

The organization of annual scientific conferences is the major trigger to development of R&D

activities and acquiring new knowledge and experience.

Gaps and spaces for improvement.

There are some minor inaccuracies in self assessment report. For example, Power Industry, Electrical Engineering, and Electrical Technologies is title of study field in Application. Power, Electrical Engineering, and Electrical Technologies is title of study field in self assessment.

In some course descriptions in English there are references in other languages.

There is a sufficient amount of information sources in course descriptions older than 8-10 years.

Optimization of research and teaching activities is suggested to prevent a decrease of study quality.

## **1. Management of the Study Field**

### **Analysis**

During the assessment procedure, including expert group visit, the experts have analyzed the provided self assessment report of study field and matched documents, information placed on RTU homepage. Very useful was additional impression and possibility for crosschecking information during the discussions with RTU management, faculty dean and management, study field and programmes directors, academic staff of the study programmes, employers for all programmes, graduates and students. Experts have visited the premises of faculty and got possibility to evaluate infrastructure used for study process, practical training and R&D, which also has assured experts of the high potential of used equipment and possibility to guarantee the quality and sustainable development of study field. Presentation of Moodle platform and Library has strengthened opinion about high level of informational support for activities in scope of study process and R&D.

The main documents used for analysis were: RTU strategy, list of main internal normative acts and regulations, self assessment report (it's body, annexes), plan for the development of the study field, management structure of the study field, statistics of the previous periods, notes for improvements from the previous accreditation period and related documents that complement or are referred by the mentioned ones.

The expert group during the visit, through interviews and discussions, has been looking for proof and evidence that the strategy and development plans were elaborated in correspondence with vision and mission defined and were well-understood by management, academic staff, students and industry with the aim to verify study field quality and effectiveness.

The main topics discussed and verified by expert group:

- To what extent the development plan corresponds to the vision of the industry, it's modern trends and objectives?
- How decisions are accepted about the development of the study field. What is the mechanism for decision- making in the scope of study field and programme development?
- How the represented industry is involved in planning and what dedicated actions are undertaken to increase their involvement?
- Are participants of study field development informed about essence and details of plan and planned activities?
- What actions have been taken or planned to increase the efficiency of developed system and implemented procedures for the admission of students, the recognition of the study period, professional experience, as well as for the evaluation of the achievements and learning outcomes of the students, and was these procedures logical and efficient and how they could increase the study field's visibility and to increase students' overall number?
- What actions have been made to foster academic integrity principles and mechanisms? How appropriate plagiarism detection tools are used? Are they effective and contributive to the development of the internal culture of the higher education institution?

- What actions have been made to take advantage of international, national or regional collaboration with HEI and industry?
- Is the information published on the website of the higher education institution regarding the relevant study programmes of the study field comprehensive? Does it provide important information for the candidates and the students and is published in all languages in which the study programmes are implemented?
- How the funding for study process realization and R&D was ensured?

Each of the main topics were discussed and cross-checked through all other discussions to match the declaration of RTU and faculty actual practice.

1.1. The aims of the study field “Power Industry, Electrical Engineering and Electrical Technologies” are clearly defined and justified, they are achievable and ambitious. They are in compliance with the objectives and strategy of RTU. Keynote of the RTU strategy: high quality and effectiveness – proactive link between the activity of RTU and the needs of the national economy is declared. Since the direction and enclosed study programmes are developed according to the National Development Plan for 2021-2027 of Latvia, strategy of RTU as response to the industry demands, both study field and inclusive programmes fully correspond to the current development trends and needs of Latvia's economy and corresponding sectors of industry. The process of objectives of study field achievements is guaranteed by necessary financial, organizational and material support. There is insufficiently formulated function of promoting social change consciously through educational programmes in scope of relationship between social cohesion and economic growth, on the basis that social cohesion improves formal and/or social institutions, which causally drives economic growth. The STEM model of higher education is not sufficiently described and analyzed as a trigger for development of study field.

1.2. The structure of the management at the level of faculty, study field and the relevant study programmes are oriented towards the development of the study field. They are logically and functionally organized, built on research, innovation and cooperation with the industry. The functions of various organizational units have been approved in their regulations. At the faculty level, the highest decision-making body is the faculty council. Students are represented in all RTU decision-making bodies. External partners and stakeholders are tightly involved in the study field management. Decision-making system is well balanced and efficient. The support provided by the administrative and technical staff is at high level and successfully contributes to meeting necessary needs with regard to the relevant study programmes of the study field. A decentralized management system has been provided with a certain degree of autonomy for each unit. This approach motivates the heads of units to be proactive, to plan the development of the unit, and to apply for funding. The responsibilities and duties of the head of the study programme are provided in the job description. The most important of them include: management of study programme development, improvement of the curriculum in compliance with the requirements of the scientific fields or the sectors of the national economy, implementation of quality assurance, supervision of study plan development, promotion of internationalization. But the responsibilities of the head of the study field are not described so detailed in the self-assessment report. The existing structure is compliant with the best practices of higher education institutions and Latvia's higher education normative regulations.

1.3. The admission process and procedure of students' matriculation is stipulated in the RTU Admission Regulations, which are elaborated based on the Law on Higher Education Institutions and Regulations of the Cabinet of Ministers, as well as the specific requirements of study programmes and the industry. The RTU established procedures for the admission of students, the recognition of the study period, professional experience, and the previously acquired formal and non-formal

education, as well as for the evaluation of the achievements and learning outcomes of the students are logical and efficient and are evolving in line with today's digitization trends, providing the potential students with the convenient and easy to use application tool for registration at University. Information about admission procedure is presented in detail, including, for example, study programmes register with information about study programmes at University . Assessment of student learning outcomes is carried out in accordance with the "Regulation on the Assessment of Learning Outcomes". Pedagogical methods used in the implementation of study courses, as well as assessment forms and methods are selected by the instructors responsible for the study courses in compliance with course curriculum and specifics of the programme, as well as student needs. On the basis of the Rules of Procedure, the academic staff of each study course develop criteria for obtaining an assessment and inform students about them. The process of interaction and information of students is provided both in situ and by means of ORTUS information system. The validation of the above mentioned system has been provided during discussions with employers, graduates and students in scope of Expert group visit.

1.4. RTU actively participates in different initiatives that bring forward and solve academic integrity related issues. Among them is membership as one of the founders in the European Network for Academic Integrity (ENAI). The Dictionary of Academic Integrity Terms and Guidelines is one of the newest aids that has been developed and published by RTU Press. The organizational units implementing the study programmes have developed a control mechanism, i.e., the initial check is performed in the process of interim assessment. When students draft their graduation papers, they are instructed about plagiarism and its consequences several times. Methodological materials contain detailed instructions on correct presentation of references. Since 2010 all students that graduate from any RTU study programme upload electronic versions of their graduation papers in ORTUS portal in order to improve the quality of graduation papers, create a bibliographic database of the graduation papers and use an automated control system for detecting plagiarism. RTU uses two major plagiarism control tools in the study process. There are given examples of effectiveness of plagiarism detection and a system for the issue resolution is shown. The presentation of ORTUS and MOODLE systems has demonstrated the actual implementation of an anti plagiarism system. There is a strong sense that the academic integrity principles lay in the core of study field development strategy and every day activity.

1.5. The information published on the website of RTU regarding the relevant study programmes of the study field is available, easily accessible and is in sufficiently comprehensible form. This high assessment level was approved by study field students and staff during discussions in the frame of experts visit. It provides important and necessary information for the abiturients and students and is presented in all languages in which the study programmes are implemented. The published information by opinion of experts corresponds to information in official registers. Website of RTU for candidates and students and all interested people, the ORTUS system for students and study field staff are undoubtedly modern and effective means for communication, information processing and presentation. They can be considered as a sustainable basis for study field development.

## **Conclusions. Strengths and weaknesses**

Conclusions :

The overall impression is positive and provides a strong background for conclusion about potential ability of study field management to provide sustainable development of study process, R&D activities, ability to carry on planned optimization of programmes, ensuring high standards of education for students and clear response to industry in scope of modern trends and challenges. The strong support from an elaborated internal quality management system, availability of necessary

resources, directions of scientific research that are relevant to the study field and relevant industry, cooperation and industrialization, are the main triggers for successful realization of study field strategy.

#### Strengths

1. The study field and particular programmes representing a unique and demanded field of education, are professionally tailored, documented, well equipped, sufficiently funded and supported by solid quality assurance policy.
2. The management of the study programme is well-integrated, has a balanced structure which ensures a short and effective communication path for any managerial actions to be taken providing a rational degree of decentralization.
3. Because of the study field's educational process applied nature, the development objectives and plans are inspired by industry development trends and show a healthy attitude to current and possible future challenges.
4. The actual information regarding study organization, planning, study materials and content is available online and in situ, it is understandable and useful for all participants of the study process.
5. The current communication and support practice for the students is open and effective. Admission procedures are fair and clear. Academic integrity principles are widely implemented.

#### Weaknesses

1. There is insufficiently formulated function of promoting social change consciously through educational programmes in scope of relationship between social cohesion and economic growth, on the basis that social cohesion improves formal and/or social institutions, which causally drives economic growth.
2. The STEM model of higher education is not sufficiently described and analyzed as a trigger for development of study field.

## **2. Efficiency of the Internal Quality Assurance System**

### **Analysis**

2.1. RTU has established an internal quality management system, which works in line with the RTU Excellence approach as well as the RTU Quality Policy (SAR, p.10-11). Both of these documents are publicly available online. RTU Quality Policy lays out the framework and pathways for development and improvements of the RTU Strategy, research, study process and organization and is aligned with the European Association for Quality Assurance in Higher Education (ENQA) standards and guidelines (SAR, p.10). The RTU Excellence Approach and quality policy are mutually integrated documents which require RTU to use the quality model of the European Foundation for Quality Management (EFQM) (SAR, p.10).

RTU quality policy and its implementation are based on the following principles (RTU Quality Policy, [https://www.rtu.lv/writable/public\\_files/RTU\\_quality\\_policy\\_of\\_rtu.pdf](https://www.rtu.lv/writable/public_files/RTU_quality_policy_of_rtu.pdf)):

- Activities aimed at national sustainable development;
- Leadership and unity in achievement of the aims;
- Systemic and process-oriented approach;
- Continuous, developmental improvement;
- Fact-based approach to decision making;
- Cooperation with partners;
- Personnel involvement and competency;
- Process analysis and management;
- Risk and opportunity management.

Collecting the information found in SAR, as well as during the on site visit, experts have come to a conclusion that by maintaining the principles defined in the current RTU Quality Policy, the aims and learning outcomes in the study field and its programmes are being achieved. By creating links between all of the parties involved in ensuring the quality assurance system - student representatives, partners, professional associations, student organizations, other higher education institutions, businesses and organizations, academic staff and graduates, RTU has ensured continuous development mechanisms, which were also evidenced by the experts during the on site visit (SAR, p.11). For example, as the survey cycles end, the employees of the RTU Department of Quality Management review the complaints found and they are analysed and dealt with. An example is given with complaints about academic staff's English language - if such a problem has been noted, the academic staff member in question is obliged to take extra English courses provided by the university. Another problem situation is given as an example regarding ERQM excellence model, that at the moment is integrated in the each level of university and the quality assurance system. Difficulties were found on how to structure the model for the university processes (as it is usually meant for businesses), regarding external stakeholders (employers, industry, partner universities). That was an issue a couple of years ago, now the indicators are in place. Each year the quality assurance system is developed even more, involving key stakeholders, internal RTU staff, students and other stakeholders. During the on site visit it was admitted that next steps in the development process are to educate about it more internally, so that everyone starting from the academic staff, from the students is familiar with the quality policy.

2.2. RTU has developed a procedure for the development, approval and supervision of the study programmes - "Approval of the new version of the Procedure of Application, Development and Amendment of Study Programmes" (SAR, List of the main normative acts and regulations, Annex 6). All of the procedures defined there are clear and logical. Each faculty has its own advisory board from the industry, which is actively participating in the development of the study programmes, as well as it is mandatory to have an expert from the industry on the Committee of the Study Direction. The proposal for changes in a programme or study course can come from either side - student self-government, surveys, industry. Any proposed developments of a study programme is examined and approved by the Committee of the Study Direction. The evidence of this consecutive procedure being established was also found during the on site visit by the expert group.

Feedback from the involved parties is collected periodically and is inclusive of students, employers, academic staff and graduates. Student surveys are regulated through "Regulation on the Student Surveys Used in Assessment of the Educational Process" (SAR, List of the main normative acts and regulations, Annex 20). In the visit it was disclosed that the average percentage of students who fill in the surveys is 40-50%. Academic and RTU staff occasionally and individually post the summary of the surveys on ORTUS platform, however, a reverse feedback mechanism from the management and academic staff to the students about the changes made based on the summary of the surveys seems to not have been established. There are several mechanisms in place with which the feedback is collected from the employers, such as surveys after the internships have ended and RTU Council Convention. It is also planned to launch a centralized polling mechanism for employers outside the internship surveys. Graduate surveys are collected after every graduation round, however, no feedback or follow up mechanism seems to be established afterwards. Only a couple of graduates during the visit remembered the survey or said that they filled it in. RTU Alumni Association helps with the feedback mechanism and seems to be active on the online platforms available, however from the visit experts saw only a couple of alumni from this particular study field as a part of it, hence no reliable statistical conclusion can be deduced.

Several examples have been listed in the SAR and during the on site visit, where the opinion or suggestion from one of the involved stakeholders have been taken into account and changes have been made either to a study course or the programme structure in general. For example, based on

student feedback, changes were made in the course order for the Adaptronics (42522) programme, so it would be more coherent regarding the learning outcomes and topics to be studied. This particular example was mentioned during the on-site visit from the director of the study programme, as well as from the students side.

2.3. RTU collects and analyzes data annually in the form of a quality review, summarizing previously defined performance indicators. Performance indicators characterize the quality of entrant enrolment process, study process planning and the quality of implementation of studies - implementation of the initial admission plan, number of matriculated entrants vs. number of entry applications, number of graduates vs. total number of students etc (SAR, p.42). It is emphasized that the performance indicators tend to define principles more describing quality, less - quantity. The data from the quality review is submitted to RTU administration and analysed by study level, as well as study field. There is an agreement in place every year between the faculty and the Rector of RTU about specifics of the performance indicators. If these performance indicators are not met in the annual RTU quality reviews, the faculty loses the specific "performance funding". It is admitted by the RTU staff that the indicated graduate level is the hardest to keep up. The indicators are not only supposed to be reached within the faculty, but are also compared with the overall RTU level. The RTU Study Department then organizes further review, forwarding data to the faculties and study programme directors, who initialize the necessary improvements (SAR, p.42). Changes to the approved processes occur in cooperation with quality management specialists. Summarized statistics on student/graduate numbers are used to improve study direction - by allocation of state-funded places for students, programme review and development. As mentioned above, the data analysed is not only quantitative, but also qualitative. In experts opinion, the data obtained provide a coherent feedback on the study field and programmes and is later used to improve the programmes within it. An example is given with the analysis that the initial level of maths and physics knowledge for international students differs, sometimes it is very poor. Therefore RTU Information Study Centre was created in three target countries. It's aim was to provide and prepare prospective students to the level of maths and physics in RTU, as well as studying in Latvia in general. For better visualization and analysis of statistical data it is planned to develop and improve a tool in the Power BI environment, which will make the reviews more comparative (SAR, p.42).

2.4. RTU has specified the standards set forth in Part 1 of the ESG which require special attention. As it is mentioned in the analysis part of this section point 2.1., informing students and staff about the mission and vision of RTU defined in the quality policy would be room for improvement. In the context of student-centred learning, teaching and assessment, RTU has established the Centre of Academic Excellence, which acts as a bridge between teaching and different learning cultures (SAR, p.44). One of the challenges also is a relatively low activity of local students in using exchange programmes for studies abroad. During the on site visit experts identified that the issue lies within the need to work parallel to studying, especially in Master's programmes. When asked about the accessibility of information experts got misleading answers - half of the students said that there is more than enough information on the possibilities to go on exchange, however some students admitted that they do not even know about these possibilities. From the visit it seems that some study programme directors could be more involved in promoting going on exchange. To compensate for this, it is said in SAR that RTU promotes international opportunities by inviting guest lecturers and conducting study courses with foreign students, however experts did get the evidence from students and graduates that the guest lecturers were invited mostly from the local industry - a plan strengthening that might be beneficial for the internationalization and students. Overall it seems that RTU has analysed the ESG standards that could be improved and for most of them they have a plan in place on how to tackle the problem.

## **Conclusions. Strengths and weaknesses**

### Conclusions:

Experts have observed that the procedures and principles defined in the RTU Quality Policy are in place, are coherent and oriented to continuous improvement and development. RTU has developed a procedure for the development, approval and supervision of the study programmes. RTU collects and analyzes statistical data annually and consistently. RTU has analysed the ESG standards that could be improved.

### Strengths:

1. Strong ties with the industry whilst ensuring continuous development for the study field.
2. Strong evidence that the stakeholder feedback is taken into account when talking about the development of the study field.
3. New tools are developed by RTU in order to better analyse and compare relevant statistical data.
4. RTU Quality Policy is aligned with the European Association for Quality Assurance in Higher Education (ENQA) standards and guidelines.

### Weaknesses:

1. Graduate follow up and feedback mechanisms could be stronger and more widely used for improvement and development of the study field.
2. Reverse feedback mechanism to the students about programme/course changes could be strengthened.

## **3. Resources and Provision of the Study Field**

### **Analysis**

3.1. The funding is set and managed according to three different sources and ways: the state law and budget, RTU internal methodologies and responsible administrators and external sources of financing and their requirements. On another side, the money is used for provision of the study process, performance funding and development funding. State funding sets: study seat basic expenses and study cost coefficients and covers programs, number of students, utilities, taxes, maintenance, equipment and partly research. Each year, the Ministry of Education and Science calculates the basic costs of a study seat for the following budget year. The state funding has been distributed in accordance with the decision of RTU Senate Methodology for the distribution and use of funding. The methodology is reviewed and revised every year.

The Strategy plan 2020-2025 sets financing goals for each RTU unit and faculty. In addition to existing financing, which must be expanded - tuition, local and international projects, plan envisages increase revenues from lifelong learning courses.

In 2017 and 2018 the World Bank conducted research on higher education governance in Latvia. After that, the issue of weak positions of deans had been addressed. More than half of the new performance income now is used to provide funds to faculties where the dean is the budget holder. It opens up new opportunities for faculty-level strategic development. Deans now have greater opportunities to ensure the development of faculties, which is their responsibility and since the academic year 2019/2020, deans of the faculties have additional funding from the tuition fees of foreign students. As a result, the activities of the persons responsible for the implementation of the study programs were facilitated. To some extent the above mentioned changes could support financing capability for teaching and research staff. Partly involvement of teaching staff from industry could be recognized, however such approach has significant weakness - they can't be actively involved in the process. Additional political activities must be undertaken by the RTU

administration to raise personnel salaries to the level of industry.

In the academic year 2019/2020, RTU has made changes in the budget allocation methodology. After that the heads of study programmes can attract higher level specialists for the implementation of the study process.

Funding of the study field “Power Industry, Electrical Engineering and Electrical Technologies” has been stable during the recent years. In the academic year 2013/2014 the state budget subsidies covered 91%, but, with the increase of the number of foreign students in the year 2019/2020 the state subsidy was 86%. The rest of money comes from businesses and individuals to cover tuition fees, projects, contract work, etc., as well as indirect funding from the EU. RTU has participated in the European Space Agency project since 2017.

There are eleven different financing frameworks available at present and RTU institutes and departments are managing or are involved into 331 different projects, which are running from 2016 till 2024. For example some of the projects, where the Institute of Energy Systems and Environment is involved - Establishment of Nordic-Baltic PhD and researcher mobility network in the field of the bioenergy - ReMoNet-Bioenergy - 2020 - 2024, Development and research of spread-spectrum-based control methods for magnetic resonance wireless power transfer systems - 2020 - 2023 and High power density inductive wireless power transfer systems based on novel multi-coil solutions for dynamic battery charging - 01.12.2020 - 31.12.2021.

The budget calculation is made based on the transparent methodology, which requires openness of information and a possibility for the heads of departments, faculty, dean and the University Council to react promptly in situations where it is required.

3.2. There are significant changes in the life of RTU staff, researchers and students after completion of the construction of Ķīpsala Campus in Riga this year. Campus will become the most modern engineering study center in the Baltic States. There are several departments responsible for purchase of materials, technical, methodological and informative provision, for example: the Student accommodation department, the Infrastructure department, the Student service department, the Infrastructure department. The IT department provides 53 different IT services.

RTU buildings are equipped with state-of-the-art technical support and control systems and equipment. The newest technical solutions provide the opportunity to track energy consumption to make buildings more comfortable for students, academic staff, researchers and guests. RTU is committed to introducing the concept of Green Ķīpsala at its campus by 2023. Developing the infrastructure, care is taken of all groups of people, including people with disabilities. The Campus also houses a hostel with 950 beds.

Modern, reliable, secure and unified IT infrastructure provides administrative and academic staff with up-to-date quality IT services. All IT users are provided access to the centralized system, which functions as a single digital gateway, combining information from all RTU information system components. The several IT systems are used for different purposes: Centralized Study Management System - for efficient administration of the study process; Moodle e-learning system - where the academic staff members place various electronic materials, assessment tests, homework assignments, information on a particular study course; Centralized Research Support System - records all information on publications, patents, commercialization applications, Doctoral Theses, RTU scientific journals, research staff, etc. Since 2007, more than 130,000 unique study course sites have been generated in the e-learning environment of RTU. Students can access electronic learning resources anytime and anywhere. In addition the widely supplied library can be utilized.

Proactive incident control and Data backup is also ensured. The Information Systems Security Policy envisages security checks, data transmission network monitoring, as well as preventive measures.

More than 15 upgraded and new laboratories have been established with all-new infrastructure and equipment for research of industrial processes - furniture, voltage switchboards, workbenches etc., for example: Laboratory of Electric Power Supply Systems, Laboratory of the Electric Part of Power

Plants and Substations. In addition, the Creative Student Lab has been founded with the support of JSC Latvenergo funding.

3.3. The implementation of RTU personnel policy is stipulated in the Human Resources Development Plan, which focuses on three main goals within the professional development of the academic staff: renewal of the academic staff, by promoting academic work of Doctoral students, improvement of the professional competence of the existing academic staff and attraction of foreign academic staff. The plan is developed according to results of analyses and goals stipulated in the RTU Strategy document for 2021-2025. The Department of human resource management and document processing is responsible for the realization of the plan and goals. Discussions on development of the above documents were held at different university levels, involving the widest possible range of RTU staff representatives. The important weaknesses, threats and opportunities are pointed out in strategic document.

The Centre for Academic Excellence is established at RTU in order to support RTU academic staff in the areas of pedagogical, intercultural communication and self-development. The centre organizes various educational events, coordinates experience exchange activities, provides information about the latest teaching and learning trends and provides guidance on the use of teaching and learning methods, as well as on the assessment of students' knowledge, skills and competence.

Additionally, the Career Support and Services Unit, is established to provide regular seminars to RTU academic and general staff on the issues of cultural diversity, work productivity, time planning, conflict resolution, communication culture, stress management etc. critical thinking and how to approach students with disabilities.

RTU IT User Support Centre regularly organizes training on IT systems and the latest technology tools for RTU academic and general staff.

Each semester, a core set of activities is offered taking into account the students' surveys data and information from student self-governments. The decision of the RTU Senate stipulates that in the 6-year period the lecturer must improve himself in the amount of at least 160 hours. To recognize and appreciate RTU academic staff, since 2018, RTU has been organizing contests "Annual Academic Excellence Awards" and "Young Academic Staff Member of the Year".

Academic staff is being trained in the framework of the project, with involvement of foreign academic staff, post-graduate students and degree candidates at RTU. The project activities are aimed at three issues: recruitment of post-graduate students, recruitment of foreign academic staff members and enhancement of the existing academic staff competencies, including on-the-job training of the academic staff in industry, professional English language courses for the academic staff and specialized training for the academic staff.

Daily staff duties duplicate and all elected members of the academic staff have both academic and research workload. RTU does not put a strict line between academic and research workloads, their proportion is defined individually for each member. This method is understandable considering the changes in each employee workloads, mainly in the research section. In addition, the scope of the research section very much depends on a particular researcher's activity.

With regard to the quality control of the study process, it is significant to develop competencies of the academic staff through mobility programs, as well as to involve foreign lecturers. Options of the mobility of the academic staff are evaluated as high and could be realized in different forms. Unfortunately, actual activities do not satisfy. It is stated also at the self assessment in the Strategy document 2021-2025 - Insufficient international cooperation of academic staff and poorly used mobility opportunities.

3.4. The support is provided in two directions: for prospective students and for current students. For the first ones` the consultations have been provided on study programmes and perspectives in research and industry. For current students there are different activities on study programs outside

the lectures and laboratories frame. This support also includes individual work with teaching staff. In the Ķīpsala Campus the Student Services Centre is opened to ensure day-to-day support under the supervision of the career support and different services, additionally provides answers to various questions that students may have.

The academic consultants for foreign students are also available on studies and practical issues. However, at the present it can be very difficult to solve all problems for foreigners. Due to the worldwide situation the study process has been weakened because there is a lack of direct contacts between student and teacher. This is very important, because at the meeting between experts and teaching staff a low knowledge level of foreigner students was mentioned. In addition, a number of students who are not coming from Europe have financial problems, that's why they must work in parallel with studies.

In cooperation with the companies in the industry, students are offered different scholarship competitions and thesis competitions. For example, companies JSC Latvenergo and JSC Augstsprieguma tīkls run thesis scholarship competitions in the areas of company interest. The company grants scholarships to students and provides materials and expert consultations. Furthermore, JSC Latvenergo in cooperation with Latvian Academy of Sciences on an annual basis organizes thesis competitions, when it awards the best theses.

## **Conclusions. Strengths and weaknesses**

### Conclusions:

There were significant changes in the RTU budgeting process, during the last decade. Some of them were performed after research done by the World Bank. The actual situation let's conclude that the national law, budgeting methodology and processes provide a stable financial background.

RTU has developed an excellent campus for students and personnel equipped with state-of-art possibilities. Owing a high level of digitalization, the available state-of-art infrastructure and the modern material and technical facilities for the implementation of the study field and corresponding study programmes, provide an opportunity to increase the RTU competitiveness.

The RTU efficiently implements different methods to improve the staff skills. There are several units, which are responsible for that: Centre for Academic Excellence, Career Support and Services Uni, IT User Support Centre. The methods are developed based on surveys from teaching staff, industry experts and students. Jointly with staff developed RTU Strategy document for 2021-2025 creates the confidence that administration and staff desire to develop the quality of the staff according to actual situation in industry and science as well as modern requirements.

Consultation and support has been provided in different ways, on different levels by different experts and organizations.

### Strengths:

1. Strengthened financial position on one hand and increased financial responsibility on another hand gives to deans and heads of programmes an opportunity to use money in an efficient way.
2. The budgeting methodology has been revised every year and is transparent for staff.
3. Funding of the study field "Power Industry, Electrical Engineering and Electrical Technologies" has been stable during the recent years.
4. The RTU new campus provides an excellent place for work, studying, research and living.
5. Laboratories have been established with all-new infrastructure.
6. Proactive incident control and data backup ensure efficiency and security of job.
7. There are several structures in RTU, which take care of teaching staff qualification levels in different ways.
8. Academic staff is being trained in the framework of the project, with involvement of foreign academic staff, post-graduate students and degree candidates at RTU.

9. Periodic evaluation of scientific and pedagogical qualifications is performed and pointed in the RTU Strategy document for 2021-2025, in which elaboration all staff took part.
10. The students are widely supported and consulted in different study and everyday life issues.

Weaknesses:

1. RTU teaching and research staff have lower salaries compared to industry. This could result in difficulties attracting the staff.
2. At the meeting between experts and teaching staff a low knowledge level, including English language, of foreigner students was mentioned.

#### **4. Scientific Research and Artistic Creation**

##### **Analysis**

4.1. The research activities connected to the "Power Industry, Electrical Engineering and Electrical Technologies" study field are mainly performed in the frame of research grants, funded by EU (Horizon framework programme), other international and national bodies and industrial partners. Unfortunately, not all provided information are up-to-date in the self-evaluation report (for example there is no evidence concerning the number and value of the research grants obtained from the RTU Research Support Fund for the six research platforms from 2019 to nowadays). RTU Research Support Fund which aims at providing financial support for various research related activities (such as support for maintenance of research equipment, protection and licensing of intellectual property, publishing of scientific journals, participation and organization of scientific conferences, etc.) is also a significant financial resource for the involved researchers.

The research management at RTU level is well-organised since the main research activities are essentially integrated in the six research platforms (Energy and environment; Cities and development; Information and communication technologies; Transportation; Materials, processes and technologies, and Safety and security). The research strategies and interests of the Faculty of Electrical and Environmental Engineering (further - FEEE) coordinating the study field under evaluation are strongly connected to the topics of almost all these platforms, which can also obtain financial support from the above mentioned RTU Research Support Fund.

The five main research areas named in the self-evaluation report (power electronics technologies for lighting systems, electrical drives, use of renewable; energy resources and power flow control; automation and robotics of production; smart transportation control systems; control, optimization and automation of power generation and electricity supply; and development of innovative electrical machinery, apparatus, and devices) are totally in line with the direction of the evaluated study field and the development aims of the university.

The data concerning the number of publications of the academic staff given on pages 77 and 85 of the self-evaluation report seems to be not in line with those from the List of publications of academic staff 2014-2020 Annex. The numeric data related to the publications of the academic staff involved in the study programmes under evaluation is not provided in a very clear way since they are mixed with the scientific production at RTU level and not only the reporting period is considered. In the analysis mainly the apparently more precise data from the attached Excel file were considered.

The main research activity evaluation criteria (metrics) are related to the publications indexed in SCOPUS. This is not in line with the general European trend to take as reference the papers indexed in Web of Science (WoS), and to set the focus on those published in high impact journals from Q1 and Q2 quartiles. Even if the number of SCOPUS indexed publications at the whole university level increased spectacularly, this is not valid for the academic staff involved in the evaluated study field. In the last four years a constant decrease can be observed (see the figure on page 77) both concerning the number of indexed papers and the citation index. From about 130 in 2018 to only 93 in 2020. The same tendency can be noted in the case of the number of papers indexed in WoS: 106

in 2018, 96 in 2019 and only 40 in 2020 (see Annex List of publications of academic staff 2014-2020). While in the last 5 years 598 papers were indexed in SCOPUS, only 377 can be identified in the WoS database, meaning around 63% less. Anyway, the number of SCOPUS indexed publications is very low considering the number of both the involved academic staff and the research projects. In 2017 around 130 SCOPUS indexed papers were published (upon the data from the above-mentioned figure) by 22 researchers, while in 2020 less than 80 by 32 academic staff personnel involved in the evaluated study programmes. The explanation for the decreasing number of publications given in the self-evaluation report is confusing, as it is stated that this diminution is "due to the fact that the number of publications in scientific journals is growing and substantially faster than the number of conference reports". More plausible is the presumption of an academic staff member given during meeting them: the share of research projects funded by industrial partners is increasing and the obtained results are confidential, so less results can be published. For reliable conclusions, RTU would need to conduct an in-depth internal research on the issue.

The two Ph.D. study programmes in the frame of the evaluated study field (Computerised Control of Electrical Technologies and Smart Electrical Engineering) are related to emerging technologies in electrical engineering and are strongly connected to the EU and national directives concerning the prioritized research fields. As they are offered also in English, these programmes have the potential to attract also foreign students, who can contribute by their own experience and involvement in the ongoing research projects at FEEE to the increase of visibility and reputation of the faculty. This potential seems not to be sufficiently exploited. In the last years the offered Ph.D. thesis topics are mainly connected to research projects to be performed, and thus also to research field of international interests.

4.2. Even if there is a clear intention to integrate scientific research and teaching process in the study field under evaluation the results are questionable. The own research results are not efficiently introduced in the given courses. Both the students and graduates were emphasizing the need of modernizing equally the curricula and the content of the disciplines to be more practical and in line with the modern technological trends. For these purposes, the intensive educational employment of the own research results should be the most obvious way.

4.3. At FEEE a special focus is set on performing scientific research by international cooperation. In the last years, most of the academic staff from the "Power Industry, Electrical Engineering and Electrical Technologies" study field were involved in numerous international research projects. During the report period, 6 FP7 and 6 Horizon 2020 projects covering a wide range of topics in the field had as director academic staff members from FEEE. It should be also mentioned, that the FEEE funding from the EU research programmes in the reporting period was 25% of all the research budget. The efficiency of international collaboration is not highlighted only by the great number of such projects, but also by the great ratio of the scientific papers published together with foreign co-authors. Even if it is not mentioned in the self-evaluation report, for RTU joining the "European University of Technology (EUT+)" initiative may mean an impetus in new international research collaboration.

4.4. At RTU to receive their entire salary, the academic staff must perform beside daily academic work also scientific research. Professors and associate professors are re-evaluated and re-elected every six years, and a major criterion is their scientific activity and results (number of publications/patents, granted funds from research projects, etc.). Also, the funding of each faculty depends on these research achievements. All of these results are contributing to increasing visibility and value both of the university and of the involved academic staff members. Upon the meetings with the academic staff, it could be concluded that most of them are involved in research activities, which takes 40-50% of their time. This strong research commitment is the result of the mechanisms

developed at RTU encouraging/forcing the teachers to also perform research activities. Beside assuring the organizational frame of the research, the university has also developed effective financial support mechanisms (mainly by means of the above mentioned six research platforms).

4.5. RTU developed several mechanisms to promote the involvement of the students of different study levels in scientific research mainly in the frame of ongoing national and international research projects. These include summer schools promoting research, special funds for student researchers, Scientific Technical Student Conference, etc. Unfortunately, it seems that bachelor level students aren't in the focus of such actions. The number of students involved in research at bachelor and master level is hard to estimate upon the data provided in the self-evaluation report. Upon the discussions experts had with them this number is low. The main reasons are the lack of interest and time (since a significant part of the students are working in parallel with their studies). Also, the number of enrolled doctoral students in the two Ph.D. study programmes in the frame of the evaluated study field could be greater since there are enough research projects to work for and there are also generous Ph.D. grants offered by RTU. Such internal grants are also accessible for post-doctoral researchers. A plausible reason for the students not continuing their studies at doctoral level is that the obtainable salaries (which are in line with those from the EC ERC grants) are not competitive with the remunerations could be received at companies. The university is also focusing on the attraction of the future talented students, the potential next generation researchers, by establishing the Engineering High School of Riga Technical University, a technical school coordinated by RTU.

4.6. Innovation is the main goal of research and development. RTU is fully aware of this. In the frame of the "Power Industry, Electrical Engineering and Electrical Technologies" study field innovative forms of study programmes are introduced in a wide range of areas and levels. In order to make the students aware of the importance of innovation, in all the study programmes the "Design of Innovative Products and Entrepreneurship" course was introduced as a mandatory course. Another appreciable action was the initiation of the "Innovation Grants to Students" project, which aims to develop innovative thinking, creative competences, and entrepreneurial skills of different study level students. RTU is co-organiser of "DEMOLA Latvia", an innovation platform which facilitates cooperation with companies, which can submit challenges (also technical ones) to be solved within a 12-week intense design thinking process by the most talented Latvia's students. This is not only a very beneficial brain shaping and development possibility, but also a good forum where future engineers and their employers can meet and share their interests. There are several other commendable actions organized by RTU for increasing the awareness of students for innovation. These all are excellent opportunities also for FEEE to attract students for joining research teams.

## **Conclusions. Strengths and weaknesses**

Conclusions:

The direction of the scientific research activities connected to the "Power Industry, Electrical Engineering and Electrical Technologies" study field totally complies with the trend of the study programmes taught in this study field. Both RTU and FEEE are strongly devoted to increasing the research activities connected to the "Power Industry, Electrical Engineering and Electrical Technologies" study field. For this adequate organizational mechanisms and financial resources are allocated.

The potential of the doctoral programmes and Ph.D. students is not currently sufficiently exploited. Despite the research topics offered in the frame of the two Ph.D. study programmes organised under the umbrella of the evaluated study field are of a great variety, emerging and in line with the international trends, yearly only few Ph.D. students are enrolled and are defending their thesis.

The obtained research results seem significant, but these are not sufficiently fructified in valuable scientific publications and introduced in the curricula of the taught disciplines. The number and significance of the academic staff are not in accordance with the number and value of the research outputs (especially of published papers).

Strengths:

1. The mutually commitment of RTU and FEEE for increasing the research activities in this field, and the ways for assuring funds via diverse internal grants to enhance the motivation for research of both academic staff and students;
2. The financial support of research by means of the RTU Research Support Fund, Ph.D and post-doctoral grants, etc.;
3. The strong connection of the research activities performed by the academic staff and students from the study field under evaluation with the six main research platforms at RTU. Their main research areas of interest are fully in line with the direction of the study field and the development goals of RTU;
4. The strong connection of the two Ph.D. study programmes organized in the frame of the evaluated study field to the emerging electrical engineering technologies and to EU and national directives concerning the prioritized research fields;
5. The very good international cooperation in research (as concerning the number and significance of the winning projects);
6. The great share (25%) of the FEEE research budget obtained by EU research programmes funds;
7. The sound research dedication of the academic staff mainly due to the mechanisms developed at RTU for encouraging/forcing the teachers to also perform research activities;
8. The great variety of innovative solutions promoting actions related to the study field.

Weaknesses:

1. Some data did not cover the whole period of the self-assessment, and the number of publications varies from place to place and sometimes is unclear;
2. The strong decrease of the number of SCOPUS indexed publications written by the academic staff involved in the study field and the same negative tendency in the case of the WoS indexed publications. This undesirable trend is also in the case of the citations of the papers;
3. The low number of Ph.D. students involved in the frame of the two doctoral study programmes in the study field under evaluation;
4. The weak integration of the obtained own research results in the teaching activity.
5. There is space for improvement in the evaluation of the research output performed by the academic staff.

## **5. Cooperation and Internationalisation**

### **Analysis**

RTU values strong connections with international and national partners both in industry and academia (University of Latvia, Institute of Physical Energetics). This is also visible in the organization of study field “Power Industry, Electrical Engineering and Electrical Technologies”, where strong bonds between university as well as faculty of Electrical and Environmental Engineering (FEEE) with different partners has been formed.

Typical cooperation with industry within the study field include guest lectures, internship opportunities, problem-based study and project-based study exercises and development of theses. The most significant national industry partners in the study field “Power Industry, Electrical Engineering and Electrical Technologies” include all the key players of Latvia's market, related to the field. The strong connections are visible also through the workplaces of alumni of the study field,

who often are incorporated with the main companies relevant to the field in Latvia.

In order to attract students from abroad, a broad range of activities and channels are used. Among them are participation in various educational exhibitions and seminars organized by educational agencies in target markets, direct contacts with partner universities and educational agencies, usage of public relation tools and social media channels. Annual Doctoral Schools are organized in the frame of the study field, which provides the platform for guest lectures delivered by a number of internationally recognized scientists and experts in electrical engineering. The students have brought out their desire for a more active involvement of international guest lecturers within curricula, which experts find also beneficial for the attraction of international students studying in the English language.

The infrastructure and equipment for study, as well as R&D work are in accordance with modern levels. According to the self-assessment report provided by RTU as well as the interviews, which the experts have conducted with staff and students related to the study field, a large portion of the modernization of the laboratory facilities is coming from first hand contact with industrial partners relevant to the field. This stresses the importance and mutual benefit of RTU and its industrial partners, as by providing high level infrastructure for the studies, companies enhance the quality of future workforce in the field. Companies donate as well as offer several discounts for RTU regarding upgrading laboratory equipment, showing their first-hand interest in the involvement of educating new specialists. The cooperation is of utmost importance regarding necessity for enhancement of the study process and the needs of scientific research.

Field relevant associations and organizations (such as Latvian Electrical Engineering and Electronics Industry Association, Latvian Energy Efficiency Association, etc.) are actively incorporated to the development of studies. One form of this cooperation is the matching of the study field curricula to the field related professional standards “Electrical Engineer” and elaboration of the standard “Chief Electrical Engineer”. Similarly, the industrial sector and related associations are involved in the development of programmes through the university level advisory board, faculty level advisory boards and study field commissions. This practice ensures the interest of the industry in qualification of the specialists and is beneficial to solving the growing problem of the lack of electrical engineering specialists.

There is a system in place, in order to help the students to find their traineeship placements within the study field. In a Senate resolution from 2019, there are internship coordinators in place within organizational units to fulfill the task. For additional assistance for traineeships, students can contact the Career Support and Services Unit, where career consultants and project managers can help students to communicate with companies and vice versa. To give the students possibilities to meet the potential employers face to face, RTU Career Days are organized. All these activities are complemented with an additional website, where students can find placements and companies can post their vacancies, as well as a number of practical competitions for students, organized together with the companies. Cooperation agreements with companies and organizations are renewed annually.

Regarding international cooperation, students and alumni of the study field value the industrial internship possibilities provided to them by RTU in cooperation with Daimler AG in Germany in particular. From their stays in foreign academic institutions German and Danish universities were mentioned on several occasions. Self-assessment report as well as interviews with staff bring out the cooperation with other organizations as well, but these connections seem more oriented towards staff and post-graduate students.

## **Conclusions. Strengths and weaknesses**

Conclusions:

The study field “Power Industry, Electrical Engineering and Electrical Technologies” has formed

strong bonds between RTU as well as FEEE with different partners in Latvia and beyond. This is beneficial for improving the international perspective of the study field, ensuring the quality of the studies, modernization of equipment, actuality of student theses and internships, providing higher qualified alumni. Traineeship options are communicated to the students through various channels and a system for finding a company for internship is in place. Although existing in the form of visiting lectures in the annual doctoral schools, larger involvement of international guest lectures is desired by the students, which is also beneficial for the international students studying in English language.

Strengths:

1. Industrial sector is actively involved in development of studies, materials and infrastructure.
2. There are a number of foreign academic organizations involved for Exchange of staff, students and invited lectures in summer schools.
3. Students value the possibility of foreign internships.
4. Students are generally well informed of their mobility options.

Weaknesses:

None identified

## **6. Implementation of the Recommendations Received During the Previous Assessment Procedures**

### **Analysis**

The recommendations provided during the previous procedures for the assessment of the study field have been implemented. The following improvements were implemented:

- increased volume of training courses and the number of programmes carried out in the English language,
- significantly improved study infrastructure (new building for the Faculty of Electrical and Environmental Engineering and refurbished laboratory equipment),
- improved local and international cooperation with higher education institutions and research institutes,
- increased full-time equivalent (FTE) of the assistant research personnel, improved support for student mobility.

The only point where there could be a discussion if the recommendations provided during the previous procedures for the assessment of the study field are fully implemented is the following point. The recommendation was placed to incorporate a system to make completion of surveys mandatory for students, which is somehow an ambiguous recommendation. The system of student survey was established and it is assumed it provides feedback to the teaching process.

### **Conclusions. Strengths and weaknesses**

Conclusions:

The recommendations provided during the previous procedures for the assessment of the study field have been implemented.

Strengths:

1. New faculty building and refurbished laboratory equipment.
2. Increased full-time equivalent of the assistant research personnel.

Weaknesses:

1. The student survey process for feedback for the faculty about the teaching process exists. Some optimisation of the process is possible, in a sense that the obtained information will be the most representative.

## 7. Assessment of the Requirements for the Study Field

- 1 R1 - Pursuant to Section 5, Paragraph 21 of the Law on Institutions of Higher Education, the higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study direction whilst implementing their internal quality assurance systems:

**Assessment of compliance:** Fully compliant

RTU has several mechanisms for study quality improvement, including RTU Quality Policy as well as RTU Excellence Approach and the mechanisms for evaluating teaching staff, getting feedback and updating relevant study programmes (SAR pp., 11.-15.)

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

**Assessment of compliance:** Fully compliant

RTU maintains a Quality Policy (QP) that dictates the procedures for quality assurance and development of study programmes with clearly defined procedures, as well as RTU Excellence Approach. (SAR, p. 10., pp., 11.-15.)

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

**Assessment of compliance:** Fully compliant

The internal development and review of study programmes takes place in accordance with the "Procedure for the application, elaboration and amendment of the study programmes" (approved at the Meeting of RTU Senate on 26 April 2021, Minutes No 649). Inspection and supervision of the programmes is carried out annually. (SAR, p. 12)

- 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 made public.

**Assessment of compliance:** Fully compliant

The evaluation of students results and learning outcomes takes place in accordance with the "Regulation on the Assessment of Learning Outcomes" (approved at the Meeting of RTU Senate on 29 May 2017, Minutes No 610) and "Regulation on Final Examinations at RTU" (approved at the Meeting of RTU Senate on 26 April 2021, Minutes No 649). (SAR, p. 13)

- 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

RTU has a system to make sure that the teaching staff have required qualifications and competences, which are assessed and evaluated every two years.

The Centre for Academic Excellence (CAE), develops a strategy for the professional advancement of academic staff, which is in line with Article 16 of Cabinet Regulations No 569. (SAR, p.13)

- 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 set performance indicators are assessed and analyzed and reflected in self-made quality assessment reports. Information on the student progress, academic achievements, drop-out rates, student satisfaction with the study programmes, and graduate career is summarized using statistical methods and surveys and with cooperation with the State Revenue Service. (SAR, p.14)

- 7 1.6. The higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study direction whilst implementing their quality assurance systems.

**Assessment of compliance:** Fully compliant

As disclosed in the RTU Quality Policy internal quality is ensured by the Faculty Council, the Study Direction Committee and Directors of the study field, Directors of the study programmes, administration of the institutes and chairs implementing study programmes.

In order to ensure continuous development of the study programmes, RTU Study Direction Committees monitor academic activities in the relevant study field and are responsible for the quality of the study programmes within the study field.

(SAR, p.15)

- 8 R2 - The cooperation with different organisations from Latvia and abroad implemented within the study direction ensures the achievement of the aims of the study direction.

**Assessment of compliance:** Fully compliant

RTU has 36 cooperation agreements in place, within different areas of interest revolving around studies, mobility and scientific research with foreign higher education institutions (SAR, p. 95, Annex "Collaborative universities.doc")

The cooperation implemented in RTU contributes to the specific features of the study field and the programmes within it.

- 9 R3 - Compliance of scientific research and artistic creation with the development level thereof (if applicable).

**Assessment of compliance:** Fully compliant

RTU has developed mechanisms for the involvement of the teaching staff in scientific research. Summary of scientific research can be found in SAR, Annex "List of publications academic staff 2014-2020", however the experts lack information about the scientific publications of some of the academic staff members.

- 10 R4 - Elimination of the shortcomings and deficiencies identified during the previous assessment of the study direction, if it has been conducted, or the implementation of the provided recommendations.

**Assessment of compliance:** Fully compliant

Taking into account the information given in SAR, its annexes and information acquired during the on-site visit it is evident that the previous recommendations have been implemented.

## 8. Recommendations for the Study Field

### Short-term recommendations

Optimisation of the three processes: conduction of teaching, conduction of research projects and conduction of industrial projects is needed in a way that the level of the primary activity: teaching process, is not decreased.

To use also as a main research activity evaluation criterion (metrics) the number of papers indexed in Web of Science (WoS), and to set the focus on those published in high impact journals from Q1 and Q2 quartiles.

The STEM model of Higher Education is in need of more sufficient description and analysis as a trigger for development of Study field. Implementation of recommendation should be done before Accreditation commission session .

In 2 years, the more optimized reverse feedback mechanism to the students about changes made in programme/study courses, teaching process in a sense of more representative obtained information should be made available via ORTUS or other internal RTU platform accessible to students.

In 2 years additional motivating system for academic staff with objective to increase the number of SCOPUS indexing publications should be developed.

To formulate more precisely the function of promoting social change consciously through educational programmes in scope of relationship between social cohesion and economic growth in University documents should be done before Accreditation commission session.

### Long-term recommendations

Update of study courses "Recommended literature" is suggested in scope of more recent literature inclusion until the next accreditation procedure.

Graduate follow up and feedback mechanisms should be strengthened and established until the next accreditation procedure, a clear strategy for periodic follow-up might be useful to keep track and further improve the study field.

Until the next accreditation procedure, develop mechanisms how to attract more Ph.D. students in the two doctoral study programmes in the study field under evaluation.

Until the next accreditation procedure, research results obtained by the academic staff members should be better integrated in the teaching activity.

## II. "Adaptronics" ASSESSMENT

### II. "Adaptronics" ASSESSMENT

#### 1. Indicators Describing the Study Programme

##### Analysis

1.1. Professional Bachelor study programme Adaptronics, has been developed by RTU in order to

fulfill the needs of modern industry, considering the modern technological advancements and interdisciplinarity. The programme incorporates elements of different areas, such as electrical engineering, electronics, mechatronics, adaptive materials, adaptive elements and systems, their regulation, and computer control. It consists of three major specializations, namely Industrial Adaptronics; Adaptronics in Healthcare and Medicine; Adaptronics in Information Systems. The general aim of the professional bachelor study programme is to provide professional training in the field of electrical engineering and electronics, as well as enable students to acquire the basic knowledge of Electrical engineering, and to develop the necessary skills for the commencement of practical work.

The study programme, especially its name, is unique in the European context as similar programmes exist only in a few universities. From the interviews, it was mentioned by the students that the materials of the study programme are of a large interest, yet, it seems that not all the students are able to fully comprehend the uniqueness of the programme. Furthermore, to understand if there is, or to what extent there is, a difference from any other programme, aimed for the training of wide specialization of electrical engineers.

Documents state that the study programme is offered in several options:

Full time studies / latvian / 4 years, 6 months

Full time studies / english / 4 years, 6 months

Part time extramural studies / latvian / 6 years, 0 months

Part time extramural studies / english / 6 years, 0 months

Part time studies / latvian / 6 years, 0 months

Part time studies / english / 6 years, 0 months

At the same time, the self-evaluation report states that “The professional Bachelor study program “Adaptronics” is implemented both in Latvian and English, the program in English is only provided as full-time studies.” In other words, the programme is in reality at the moment not offered in all the implementation options described in the programme documentation.

The admission requirements for the programme are the general or vocational secondary education, as well as the knowledge of English is tested for applicants to study in English. The study programme consists of 180 credit points, including study courses (140 CP), internship (20 CP), and state examination (20 CP), together with Bachelor thesis defense. Upon graduation, the graduates receive a Bachelor’s degree and the qualification of Electrical Engineer, giving the possibility of entering the professional engineering market or continuing the studies in the Master’s level.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The programme is unique and looking in the future, aiming to be a strong interdisciplinary professional programme embedding to itself elements of different specializations and disciplines. There are a number of implementation options provided in the documents of the study programme, both in Latvian and English, although in reality, English studies are provided for full time studies only. The students are interested and pleased by the uniqueness of the programme, although, it seems not all students understand if there is a difference with any other electrical engineering programme.

Strengths

1. Uniqueness of the programme in European context.
2. Specializations further specifying the industrial directions of gained knowledge for students.

Weaknesses

1. Students seem not to fully understand what “Adaptronics” means and what is the exact uniqueness within the programme.
2. Studies in English language are offered only in full time studies, although the documentation also presents part time and part time extramural study options.

## **2. The Content of Studies and Implementation Thereof**

### **Analysis**

2.1. The descriptions of study courses and modules are understandable for the students. There is a good practice of using industry input for the final theses. Often this is combined with the internship or traineeship, which the students are taking in industry during their studies. Employers are generally agreeing that the students, which have spent time in their companies as trainees are of good quality, which implies that the content of the studies is relevant and complementary, and it complies with the aims of the study programme, ensures the achievement of the learning outcomes, and meets the needs of the relevant industry and the scientific trends.

The study programme consists of 180 credit points, including study courses (140 CP), internship (20 CP), and state examination (20 CP), together with Bachelor thesis defense. Upon graduation, the graduates receive a Bachelor’s degree and the qualification of Electrical Engineer, giving the possibility of entering the professional engineering market or continuing the studies in the Master’s level.

2.2. The study implementation methods are modern, the laboratory facilities used for the studies are well equipped and integrated to the study programme. There is a good amount of materials available for the students, including the digital learning possibilities. Students mentioned that on some occasions, study material provided by the more experienced and older members of the staff is not updated enough and is somewhat outdated (courses and staff not specified in the interviews).

In order to satisfy the requirements defined in the program and every course, in comparison to full time studies, a longer time for completing the program and a lower number of credit points is set for half-time studies, in particular, less than 40 CP per academic year and less than 40 academic hours per week. As full-time students have less practical experience in the field of study, the applied methods include study trips to the industry companies, visiting lectures by the industry professionals, etc. As regards half-time students, who have practical experience in most cases, the employed teaching methods consist more of lectures, practical assignments, group works, home assignments and research involving case studies and their explanation from both the theoretical and practical perspective. Within the half-time in person and half-time remote study process the focus is on the independent work of students by using both the problem-based learning and case studies, as well as the professor’s advisory role.

The student-focused education principles are considered during the whole implementation of the study process, including involvement of students in the study process and content improvement, involving different study methods from project based learning, teamwork and peer-to-peer approach, flexibility in choosing the form of studies and combining it with work, etc. Mobility and extracurricular activities are also offered to students. In order to intergrate the studies with up-to-date scientific knowledge, more students could be involved to scientific research starting from Bachelor’s level. This could improve the Intake to Master’s and PhD studies, as well as attract potential young specialists to research, innovation and study work.

Regarding the foreign students studying in English, Latvian language study course should be added to the study course plan according to the Law on Institutions of Higher Education Section 56.

2.3 The ORTUS portal is used to conduct surveys amongst students, results of which are made available to the head of the programme as well as the related staff of the study courses. Necessary

improvements are made according to results and results are considered in the process of teaching staff promotion for vacancies. Feedback is also gathered from employers, where the focus is set on the evaluation of the trainees at the internship, as well as graduates, with emphasis on reflection of the studies vs the skills and knowledge needed in the work environment.

The students, employers and graduates mostly agree, that the programme is well built, involves specializations and subjects of most areas, that the term of “Adaptronics” is containing. Employers are generally happy with the quality of the students. There are mentions from the staff and employers that the background knowledge and quality of the international students very often lags behind if compared to the local students. This means that measures should be taken in order to better target the international students that are taken into the study programme as well as to bring the background knowledge level in the similar one to the local students. Otherwise, it is hard to maintain the similar study outcomes to all the groups.

During analyses, the expert group has received a letter from the coordinator for the recognition of professional qualifications (in Latvian - Profesionālās kvalifikācijas atzīšanas koordinatore) asking us to get clear information on compliance of the RTU programmes Professional bachelor’s degree in Adaptronics (42522) and Computerised Control of Electrical Technologies (47522) qualification with Prof. standard - Electric Engineer. Expert group suggested at this step to cooperate with relevant stakeholders (ministry, university and professional association) to agree on relevant steps and activities, to solve the issue. As the professional standard was approved on 11.08.2021, the experts were provided with the comparison with the renewed standard as additional information, with which the programme is in compliance with.

2.4. Students are well aware of the mobility possibilities, especially valuing the possibilities of international internships and the experience gained from these actions. It seems from the interviews that the partnering companies have no or few experiences with international students from the programme. This leads to doubts, if the international students who study in English would gain the similar learning (practical) outcome from the programme, which the local students are able to get.

Most of the mobility is carried out using ERASMUS+ programme, where upon applying, students have to choose the curriculum and courses according to needed learning outcomes. The selected courses and study plan are approved by the head of the study programme. Recognition of study courses covered during mobility takes place according to the “Amendments to the Organisation Procedure of Erasmus+ Student Mobility” (Resolution of RTU Vice-Rector for Academic Affairs No. 01000-1.1/240 as of 29 October 2014) and “Regulation on the Recognition of the Courses Completed at Other Universities and RTU Study Programmes” (Resolution of RTU ViceRector for Academic Affairs No 02000-1.1/29 as of 4 April 2016). The recognition of ERASMUS+ mobility is carried out by the head of the study programme on the basis of the Transcript of Records submitted by the student after the ERASMUS+ mobility and a pre-signed application for the recognition of study courses.

## **Conclusions by specifying the strengths and weaknesses**

Conclusion:

The content of studies is well structured, including basic studies, specialization oriented subjects, internship and state examination including Bachelor thesis preparation, including a practical part. It is compliant to the aims and outcomes of the programme. The employers are generally happy with the students of the programme, who are entering their companies as trainees. However, the experience with international students is low and the few mentions of this group has brought forward the problem of lower background knowledge as well as quality as compared to local students. The study related infrastructure, databases and e-channels are of a high level. Mobility possibilities are known by students and the ones that have used them cherish their experience. In some cases, there are mentions of outdated study materials in case of some members of staff.

Strengths:

1. Employers are generally happy with the quality of the students.
2. Study related infrastructure, laboratories, e-learning environments and digital sources are in very good condition and available for the students.
3. Students are well aware of the mobility possibilities and cherish the experiences especially in the part of international internship possibilities.
4. Variations between the common background profiles of full-time and part-time students are taken into account and student-centered approach is offered.

Weaknesses:

1. Very different background knowledge level of international students, which seems to be lagging behind, when compared to local students.
2. Low experiences from the members of industry with the international students as trainees, which may lead to the risk of not fulfilling the similar outcomes of the traineeships for international students as to local ones.
3. In some cases, study materials are outdated and not updated enough.
4. Regarding the foreign students studying in English, Latvian language study course should be added to the study course plan according to the Law on Institutions of Higher Education Section 56.
5. More students could be involved to scientific research starting from Bachelor's level.

### **3. Resources and Provision of the Study Programme**

#### **Analysis**

3.1. The state budget subsidy to the students of professional Bachelor study programme "Adaptronics" amounts to EUR 204 351.66 (2019/2020), which is a significant raise, compared to EUR 116 262.15 (2018/2019) and EUR 86 225.59 (2017/2018). At the same time, costs per student have been rising by around 10% (EUR 4 040.66 in 2017/2018 vs EUR 4 405.04 in 2019/2020). This shows that the material support of the students for the programme is adequate and it is increasing during the last years. Staff, involved in the studies, is assuring the adequate educational support for the students, as well as management of the study programme, undertaking study support processes (organisation of study process, management of public and international relations, student records, technical support of study programmes, work related to the implementation of the study programme, etc.). By using funds for the European Regional Development Fund (ERDF) and research projects in the field of Power Industry, Electrical Engineering, and Electrical Technologies, since 2014 the study process has been implemented in a new and modern building with an up-to-date building management system. It should be mentioned that laboratories have been totally upgraded during the last years. The list of the recently acquired new equipment is long and comprises modern units to be used both teaching and research. A renewed library with advanced information systems is waiting for the students to enrich their knowledge, but also the academic staff to access the novelties in their fields. The RTU Research Support Fund provides significant financial support for a great variety of research related activities (such as support for maintenance of research equipment, protection and licensing of intellectual property, publishing of scientific journals, participation and organization of scientific conferences, etc.), which enables a successful activity for the involved researchers. Both teachers and students have access to the highly valuable international scientific databases (as SCOPUS, WoS or the most important in this field, IEEEXplore) by the subscription contracts that are concluded directly with the supplier or through the "Cultural Information Systems Centre" Latvian state agency.

## Conclusions by specifying the strengths and weaknesses

Conclusions:

RTU offers the support for the high-quality education and research in this study programme: financial, logistic, administrative. Involved staff have at their hands everything needed for high-quality teaching and research, as well the students for effective learning.

Strengths:

1. The budget used for educating students in the study program is increasing year by year.
2. Successful efforts made to develop the teaching and research infrastructure connected to this study programme.
3. Various ways of support of both education and research related to this study programme.
4. Study related infrastructure, laboratories, e-learning environments and digital sources are in very good condition and available for the students.

Weaknesses:

None identified.

## 4. Teaching Staff

### Analysis

The meetings the expert group concluded that both RTU and FEEE assumes adequate methods in a target-oriented manner to avoid quality decreasing of the teaching process within the study programme. It is stated that in parallel to academic work, some professors work in industrial companies, therefore the practical work skills and competences are transferred to the study programme.

The self-evaluation report states that "Academic staff from partner universities abroad will be recruited as needed to implement the study programme, as well as industry professionals will be invited to give more practical oriented lectures". It seems that there is no general approach or method on how and when the mentioned foreign staff or industrial specialists will be involved, rather it is the decision of the instructor of a certain subject and depends upon their personal contacts.

The qualification of the teaching staff members broadly complies with the main requirements of this study programme and set forth in the regulatory enactments. Seems the existing teaching staff may assure the accomplishment of all the aims and learning outcomes of this study programme. The qualification of the teaching staff within the last academic years (2017/2018 - 2019/2020) has been rising (respectively professors 8 vs 13; associate professors 4 vs 8; assistant professors 6 vs 11). The number of teaching staff holding the PhD degree has increased during the reporting period. In parallel, some professors work in industrial companies, therefore the practical work skills and competences are transferred to the study programme. Experienced professors and lecturers as well as PhD students and young post-doctoral researchers are involved in teaching.

In order to ensure the quality of the study content, the academic staff involved regularly improve their professional and academic knowledge at methodological seminars, conferences (national and international), as well as in scientific and research work, and participate in various scientific and methodological projects. Among those are research oriented ERDF (European Regional Development Fund), FLPP (Fundamental and Applied Research Projects), as well as ERASMUS+ projects, through which new courses and textbooks are developed. The results of the projects are regularly reported in conference and journal publications and used in their pedagogical work - lectures, seminars, other activities with students, as well as in academic tools and monographs. Many of the graduation papers are written in the framework of the projects, their activities and results. Upon the expert group meeting with the teaching staff, it was concluded that the share of their teaching and

research activity is varying from 30/70 to 50/50.

There is a survey mechanism in place, whereupon feedback, changes in courses, modules or programme in general can be made. Several examples have been listed in the SAR and during the on site visit, where the opinion or suggestion from one of the involved stakeholders have been taken into account and changes have been made either to a study course or the programme structure in general. For example, based on student feedback, changes were made in the course order for the Adaptronics programme, so it would be more coherent regarding the learning outcomes and topics to be studied. This particular example was mentioned during the on-site visit from the director of the study programme, as well as from the students' side.

The proposal for changes in a programme or study course can come from either side - student self-government, surveys, industry. Any proposed developments of a study program is examined and approved by the Committee of the Study Direction. The evidence of this consecutive procedure being established was also found during the on site visit by the expert group.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in the teaching process in the frame of this study programme. Changes in the composition of the teaching staff are resolved without diminishing the teaching quality. The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme.

The involvement of most of the teaching staff in advanced scientific research is praiseworthy. The number of the research projects they are involved in is great. The projects are international and national, and also based on agreements with industrial partners. It looks that the academic staff is effectively sharing their time among teaching and research.

Strengths:

1. High and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme.
2. Teaching staff at this moment is a good mix of experienced senior members and ambitious younger colleagues with great perspectives.

Weaknesses:

1. Regular involvement of foreign lecturers could be enhanced.
2. Part of the teaching staff have not updated some of their teaching materials.
3. Gradual integration of talented and devoted young specialists in the academic staff is needed to increase the human resource sustainability and help the university to be involved in research projects.

## **5. Assessment of the Compliance of the Study Programme "Adaptronics"**

### **Requirements**

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

**Assessment of compliance:** Fully compliant

The diploma sample provided in SAR (Annex "RECA diploms ENG") fully complies with the

procedure and regulations by which Latvian state-recognised documents of higher education are issued (Cab.Reg.No 202, <https://m.likumi.lv/doc.php?id=256157>).

The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202, however as it is a purely technical discrepancy with a few words being different, in experts opinion it does not affect the overall assessment of this criteria.

2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "Confirmation of the possibility for students to continue their education between the professional bachelor study programs "Adaptronics", "Computerised Control of Electrical Technologies" and "Smart Power Systems"", document No 01000-2.2.1-e/208).

3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "On compensation of losses in case the study program is not accredited, or the license of the study program is revoked, and a student does not wish to continue studies in another study program", document No 01000-2.2.1-e/178).

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the State Fee for Examining the Proficiency in the Official Language" (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex "On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/118).

5. 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.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Vice-Rector's for Academic Affairs confirmation (SAR, Annex "On the foreign language knowledge of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and

Electrical Technologies”, document No 02000-2.2.1-e/117).

- 6 6. 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.

**Assessment of compliance:** Not relevant

- 7 7. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 “Mandatory Provisions to be Included in the Study Agreement” (SAR, Annex “Sample of Study Agreements”).

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Partially compliant

Study course descriptions are generally in compliance with the Law on Institutions of Higher Education Section 561, Paragraph two. They have been prepared in all languages in which the study programme is implemented. However, the study course plan does not include the compulsory amount of Latvian language studies for foreign students dictated in the Law on Institutions of Higher Education Section 56. Some course descriptions which are planned to be carried out in English include obligatory literature only in Latvian.

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

**Assessment of compliance:** Fully compliant

According to the evidence provided as additional information by RTU (PS\_Elektroinženieris\_6LKI\_RECA (Only in Latvian)) the study programme fully complies with the valid professional standard in experts opinion.

The experts also had a chance to familiarize themselves with a report sent from LEEA No 2-4/603 (in Latvian - Latvijas Elektroenerģētiku un Energobūvnieku Asociācija). The report from LEEA states that, in their opinion, competencies and skills obtained in this programme need to be described more in depth in concordance with what is written in the renewed profession standard, therefore experts would suggest for the RTU representatives to get together with the association and talk through these points.

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully complies with the State Professional Higher Education Standard (Cabinet Regulations No 512). (SAR, Annex 6)

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

- 14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Partially compliant

Partially compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG\_jauns" and CV's of academic staff). Some of the academic staff members do not have publications added to the list available to experts, as well as there is no mention of practical work experience outside the implementation of this study programme and RTU.

- 15 R5 - Overall rating

**Assessment of compliance:** Partially compliant

The study programme mostly, but in two aspects still partially complies with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments. Few technical improvements would be in place:

1) Publication list of academic staff should be completed. See more in recommendations regarding this study programme.

2) The study course plan does not include the compulsory amount of Latvian language studies for foreign students dictated in the Law on Institutions of Higher Education Section 56.

## Requirements (R6-R8)

- 1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

**Assessment of compliance:** Fully compliant

The study program is fully compliant with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

There is a modern library with printed and electronic Resources, advanced information systems helping to find existing items and supporting e-learning.

In the last years many laboratories have been fully upgraded and several advanced equipment has been acquired, cross-usable in teaching and research.

The government subsidy per student is more than EUR 4000 and has been annually rising (around 10% rise through last 3 years).

- 2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

**Assessment of compliance:** Fully compliant

The teaching staff is compliant with the obligatory requirements set forth in regulatory documents. Upon self-evaluation report, it can be stated that they have the compulsory qualification and experience in the topic of their courses. They are sharing their time in teaching and research, bringing the research into teaching activities as well.

- 3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

**Assessment of compliance:** Not relevant

## Conclusions by specifying the strengths and weaknesses

Conclusions:

The programme is unique and looking in the future, aiming to be a strong interdisciplinary professional programme embedding to itself elements of different specializations and disciplines. There are a number of implementation options provided in the documents of the study programme, both in Latvian and English, although in reality, English studies are provided for full time studies only. The students are interested and pleased by the uniqueness of the programme, although, it seems not all students understand if there is a difference with any other electrical engineering programme.

The content of studies is well structured, including basic studies, specialization oriented subjects, internship and state examination including Bachelor thesis preparation, including a practical part. It is compliant to the aims and outcomes of the programme. The employers are generally happy with the students of the programme, who are entering their companies as trainees. However, the experience with international students is low and the few mentions of this group has brought forward the problem of lower background knowledge as well as quality as compared to local students. The study related infrastructure, databases and e-channels are of a high level. Mobility possibilities are known by students and the ones that have used them cherish their experience. In some cases, there are mentions of outdated study materials in case of some members of staff.

RTU offers the support for the high-quality education and research in this study programme: financial, logistic, administrative. Involved staff have at their hands everything needed for high-quality teaching and research, as well the students for effective learning.

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in the teaching process in the frame of this study programme. Changes in the composition of the teaching staff are resolved without diminishing the teaching quality. The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme.

The involvement of most of the teaching staff in advanced scientific research is praiseworthy. The number of the research projects they are involved in is great. The projects are international and national, and also based on agreements with industrial partners. It looks that the academic staff is effectively sharing their time among teaching and research.

The "Adaptronics" professional bachelor study programme is partially compliant with all the key points and requirements prescribed in the Law on Institutions of Higher Education and other regulatory enactments included in the tables from chapter 5 of this assessment report.

Although the study programme is offered in various variants of study (full-time, part-time, part-time extramural) in English and Latvian, at the moment, study option in English is only offered in full-time studies.

#### Strengths:

1. Governmental financial support for the programme is gradually rising, providing funds for conducting the studies on the programme.
2. The teaching staff is compiled from experienced as well as younger colleagues, active also in research and study related projects, bringing the activities and results of projects to the studies.
3. Uniqueness of the programme in European context.
4. Specializations further specifying the industrial directions of gained knowledge for students.
5. Employers are generally happy with the quality of the students.
6. Study related infrastructure, laboratories, e-learning environments and digital sources are in very good condition and available for the students.
7. Students are well aware of the mobility possibilities and cherish the experiences especially in the part of international internship possibilities.
8. Variations between the common background profiles of full-time and part-time students are taken into account and student-centered approach is offered.
9. The budget used for educating students in the study program is increasing year by year.
10. Successful efforts made to develop the teaching and research infrastructure connected to this study programme.
11. Various ways of support of both education and research related to this study programme.
12. High and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme.
13. Teaching staff at this moment is a good mix of experienced senior members and ambitious younger colleagues with great perspectives.

#### Weaknesses:

1. Students seem not to fully understand what "Adaptronics" means and what is the exact uniqueness within the programme.
2. Studies in English language are offered only in full time studies, although the documentation also presents part time and part time extramural study options.
3. The study course plan does not include the compulsory amount of Latvian language studies for foreign students dictated in the Law on Institutions of Higher Education Section 56.
4. Some course descriptions which are planned to be carried out in English include obligatory literature only in Latvian.
5. Some academic staff members have not added their publications to the list available to experts, there is also no mention of the particular academic staff member's practical work experience outside of RTU.
6. The introductory paragraph in the Diploma Supplement provided in English is not completely aligned with the Cabinet Regulations No 202.
7. Regarding the report sent from LEEA No 2-4/603 (in Latvian - Latvijas Elektroenerģētiķu un Energobūvnieku Asociācija) - it is written there that the competencies and skills obtained in this programme need to be described more in depth in concordance with what is written in the renewed profession standard.
8. Very different background knowledge level of international students, which seems to be lagging

behind, when compared to local students.

9. Low experiences from the members of industry with the international students as trainees, which may lead to the risk of not fulfilling the similar outcomes of the traineeships for international students as to local ones.

10. In some cases, study materials are outdated and not updated enough.

11. Regarding the foreign students studying in English, Latvian language study course should be added to the study course plan according to the Law on Institutions of Higher Education Section 56.

12. Regular involvement of foreign lecturers could be enhanced.

13. Part of the teaching staff have not updated some of their teaching materials.

14. Gradual integration of talented and devoted young specialists in the academic staff is needed to increase the human resource sustainability and help the university to be involved in research projects.

15. More students could be involved to scientific research starting from Bachelor's level.

## **Evaluation of the study programme "Adaptronics"**

Evaluation of the study programme:

Good

## **6. Recommendations for the Study Programme "Adaptronics"**

### **Short-term recommendations**

Until the hearing of Study Quality Committee, Latvian language study course for foreign students should be added to the study course plan according to the Law on Institutions of Higher Education Section 56.

Until the hearing of Study Quality Committee, review of the obligatory literature sources mentioned in course descriptions should be done in order to add literature sources for courses implemented in English.

Until the hearing of Study Quality Committee, revision the list of academic staff publications from 2014-2021 should be done, adding the publications of the missing academic staff or updating their CV's with 5 year practical work experience outside the implementation of this study programme.

Until the hearing of Study Quality Committee, the introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202.

In 2 years time find the organizing means and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

Efficient ways must be found in 2 years time, in cooperation with local industry partners, in order to provide local internship possibilities for foreign students studying in English.

Until the next admissions procedure starts for the students experts would suggest for the RTU representatives to get together with representatives of LEEA and talk through these points mentioned in the letter (No 2-4/603) with the association.

Until next admission the materials describing the study programme must be revised in order for the students to better comprehend the meaning and content of „Adaptronics“, the study programme and available variants of study.

If RTU is willing to proceed with studies in English language in all the variants of the studies, admission must be opened and such option provided in 2 years time.

Before next admission, measures must be taken to enhance the background knowledge quality of foreign student intake.

Before next admission, measures must be taken in order to assess the content of subjects according to students' feedback, in order to modernize the material and study methods where applicable.

### **Long-term recommendations**

Until the next accreditation gradually integrate talented and devoted young specialists in the academic staff to increase the human resources sustainability and help them to be involved in research projects to be make more attractive the academic career.

Until the next accreditation involve more students of bachelor level in research since they will be the future master and Ph.D. students. Organize attractive scientific competitions with consistent prizes on hot topics to attract them to research and innovation.

## **II. "Computerised Control of Electrical Technologies" ASSESSMENT**

### **II. "Computerised Control of Electrical Technologies" ASSESSMENT**

#### **1. Indicators Describing the Study Programme**

##### **Analysis**

As concerning the imposed formal requirements, the study programme corresponds to all of them. The study programme is organised in three forms: full-time studies (4 years), part-time studies (5 years) and part-time extramural studies (5 years). In all the cases the teaching language is Latvian and 160 CP must be obtained by the students for graduating.

The aim of this study programme is to provide professional bachelor education in computerised control of electrical technologies. The several tasks of the study programme are clearly stated in the provided self-assessment report.

The great diversity of knowledge and professional skills offered to the students during their studies gives them good position in the local labour market. Despite this, a constantly decreasing number of involved students since the 2015/2016 academic year could be observed.

1. The name of the study programme - Computerised Control of Electrical Technologies is expressive, totally covering its main objectives and the learning outcomes. The admission requirements are in line with the basic needed knowledge for pursuing all the disciplines foreseen to achieve the 5th professional qualification level - Electrical engineer. The Professional Bachelor Degree in Electrical Engineering can be accomplished upon the graduation of this study programme. Its aim is to provide professional bachelor education in computerised control of electrical technologies, and to prepare students for professional master studies in different subfields of electrical engineering (naturally inclusively the continuation of this study programme), which would allow them later to pursue a Ph.D. degree. The admission of potential candidates is made based on the results of centralized examinations (CE) in mathematics, the Latvian language and a second - foreign language. A priority is given to students with good CE results in physics and chemistry. The graduated students, having the Professional Bachelor Degree in Electrical Engineering and a Qualification of Electrical Engineer may work as electrical engineers at any company, performing

relevant duties in the operation, development and design of electrical technologies. Within the admission criteria, two humanistic disciplines (Latvian language and a second foreign language) are also considered, thus the share of realistic field knowledge evaluation of the future students is diminished.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The study programme formal indicators and their reflection in all the provided documentation totally corresponds to the existing regulations. The name of the study program, the issued degree, qualification and gained professional skills, the study programme aims and goals, outcomes to be achieved, and admission requirements are perfectly interrelated and mutually complementary.

Strengths:

1. The way the greatest part of the self-assessment report was written. All indicators and formal attributes are well-specified at professional level, corresponding to the current regulations. The interrelation between components of indicative evaluation is visible and undoubted.

Weaknesses:

1. The decreasing number of students choosing this study programme.

## **2. The Content of Studies and Implementation Thereof**

### **Analysis**

1. In the self-assessment report the descriptions of the disciplines, the traineeship and the final thesis are adequately detailed. All of these are in line with the mandatory regulations. In most of the cases, the content of the disciplines is pertinent and totally in line with the main aims of this study programme. The students and employers stated that in some cases of the field-specific professional study courses their content could be modernized to integrate the new scientific achievements in the given field and the research results of the teachers too. Also, these contents should be more practice-oriented, as both the actual and graduated students pointed out during the organized meetings. Some complementary among the courses can be identified. For the students the curricula offer a real chance to accomplish the foreseen learning outcomes and thus to have the skills needed on the labour market.

For graduating 160 CP (local Latvian credits, equal to 240 ETC) are needed for each study form. This value consists of study courses (128 CP), internship (20 CP) and the final state examination (12 CP). The final examination includes the elaboration and public presentation of a Bachelor Paper (diploma work) having a practical project part. All of the above fully complies with the State Professional Higher Education Standard (Cabinet Regulations No 512). The content and tasks of the mandatory internship are imposed in accordance with the given professional degree and qualification which will be obtained after graduating. It can be stated, that the study programme implementation in both study forms is appropriate.

The expert group has some concerns about the title and the content of some courses. It considers that while most of the disciplines are offering a wide knowledge about the given topics, there are some courses, like "Data base engineering technology in electrical transport" (EEI289), "Web technology and web-programming in electrical transport" (EEI298), which are excessively focusing only on a specific application of the given field, which may limit the knowledge gained by the students undertaking the courses.

There are 6 electrical machines-related courses. Their content is not adequately distributed, and some topics are overlapping. The most strange course is the "Contactless Electrical Machines and

Basics of Designing" (EEM729). Seemly is focusing among a lot of others on brushless machines. In this there are illogically mixed topics normally belonging to other disciplines. It is not clear why some design-related issues are included here while there exists a dedicated course for this, "Electrical Machines Designing Calculation" (EEM410). The brushless DC machine and the synchronous machine both could be taught within the "Electrical Micromachines" (EEM306), or the "Electrical Machines of Automatic Systems" (EEM427) disciplines. Stepper motors studies are included both in the frame of the before mentioned two courses.

2. The 8 learning outcomes mentioned in Annex 8 all are pertinent and in line with the "Electrical Engineer" professional standards. The aims of the tasks are also closely linked to these outcomes. In the self-assessment report it is stated that the content of the courses is regularly reviewed and improved, but this is not justified in documents. This is valid also for other organized actions for increasing the course contents and the overall education process in the frame of this study programme, as seminars for the reaching staff, questionnaires at the end of the internship. Student-centred learning and teaching principles are intended to be applied, but no plans of achieving these are included.

3. Upon the "Regulation on the Assessment of Learning Outcomes" every year, in both semesters RTU Office of Vice-Rector for Academic Affairs regularly conducts student surveys on the ORTUS portal. Even if the ratio of those responding to this request is small, it can be concluded that the feedback of the responding students is strongly positive. The survey outcomes are considered by the management staff, and are also used for measures taken for improving the quality of teaching.

4. A great diversity of incoming and outgoing mobility opportunities are available for students of this study programme. Several cooperation with numerous foreign universities exists, as it can be seen from the self-assessment report, most of them in the frame of the ERASMUS+ programme. There are also foreign companies hosting the students of this study programme (as Daimler, Germany). The learning achievements are recognized by the sending university.

The mobility possibilities are promoted in a great variety of ways from whiteboards inside the buildings (as experts could see during the on-line video recorded visit), via ORTUS, to social media. Despite having this information, there are several students not interested in these mobility actions. The main reason, as we concluded upon the meetings with the students and graduates, is that a great part of them is working during their studies, and they cannot leave their jobs for a longer period.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The global impression upon the self-evaluation report and the organized meetings concerning this criterion of the expert team is positive. Some improvements must be done to make the course topics more attractive and close to the practical issues required by the companies hiring the graduates. More focus should be set on the feedback of the students and the results of the regular questionnaires.

There is a need to restructure the syllabuses of some (mainly the electrical machines related) courses.

The study programme is in line with the regulations and the good practices both in EU and Latvia. In general, the teaching process can guarantee the main aims of the programme and the achievement of the established learning outcomes.

RTU offers a great diversity of student mobility upon numerous cooperation agreements with foreign universities and companies. Unfortunately, only a small part of the students benefited from these

excellent opportunities. The achieved learning outcomes during these foreign mobilities are recognized by RTU.

Strengths:

1. The mandatory internship to be performed for increasing the practical skills of the students;
2. The practical character of the diploma work;
3. Using the ORTUS portal for the easy accessibility of students to the required student surveys and a facile and flexible data processing;
4. Cooperation with foreign companies in hosting students for internships.

Weaknesses:

1. There are disciplines covering a very narrow segment of their topic;
2. During the organized meetings with actual and graduated students, they emphasized the need to better shape the content of the field specific professional study courses to the real industrial needs. These observations were general, without naming the courses in case.
3. Insufficient share of practical work in the syllabus of the courses.
4. Weak use of advanced technologies (especially simulation software) during the practical teaching activities with the students.
5. Some course contents are mixed up in the relationship with other ones (especially those of electrical machines). Overlaps among course contents could be identified.

### **3. Resources and Provision of the Study Programme**

#### **Analysis**

1. As concerning the material support of the students from the "Computerised Control of Electrical Technologies" study programme, is adequate and it is increasing during the last years (from 3866.02€ in the 2016/2017 academic year up to 4405.04€ by now). The general staff of RTU are totally involved in the management of the study programme that undertake study support processes (organization of study process, management of public and international relations, student records, technical support of study programmes, work related to the implementation of the study programme, etc.). By using funds for the European Regional Development Fund (ERDF) and research projects in the field of Power Industry, Electrical Engineering and Electrical Technologies, since 2014 the study process has been implemented in a new and modern building (seen during the on-line visit) with an up-to-date building management system. It should be mentioned that 13 laboratories (also visited) have been totally upgraded during the last years. The list of the recently acquired new equipment is also long and comprises modern units to be used for both teaching and research. A renewed library with advanced information systems is waiting for the students to enrich their knowledge, but also the academic staff to access the novelties in their fields. The RTU Research Support Fund provides significant financial support for a great variety of research related activities (such as support for maintenance of research equipment, protection and licensing of intellectual property, publishing of scientific journals, participation and organization of scientific conferences, etc.), which enables a successful activity for the involved researchers. Both teachers and students have access to the highly valuable international scientific databases (as SCOPUS, WoS or the most important in this field, IEEEXplore) by the subscription contracts are concluded directly with the supplier or through the "Cultural Information Systems Centre" Latvian state agency.

#### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

RTU offers the entire support for the high-quality education and research in this study field: financial,

logistic, administrative. The involved teachers have at their hands everything needed for a high-quality teaching and research, as well the students for an effective learning.

Strengths:

1. The budget used for educating yearly 1 B.Sc. student from this study program is increasing year by year;
2. The successful efforts made to develop the teaching and research infrastructure connected to this study programme;
3. The various ways of support of both education and research related to this study programme.

Weaknesses:

Not identified.

#### **4. Teaching Staff**

##### **Analysis**

1. Even if they are not sufficiently detailed in the self-assessment report, upon the meetings the expert group concluded that both RTU and FEEE assumes adequate methods in a target-oriented manner to avoid quality decreasing of the teaching process within the study programme. The inevitable changes in the composition of the teaching staff in the last years were resolved in a manner not to decrease the teaching quality. The involvement of teaching staff from top industry professionals and from foreign universities is weak by now. It is not clear when the management will focus on it since in the self-evaluation report it is stated "if necessary".

2. 46 teachers (13 full professors, 8 associate professors, 9 lecturers and 16 teaching assistants) are assuring the adequate educational support for the involved students. Both professors with a long lasting experience and young assistants are included in the teaching staff of this study programme. Even if the number of (probably young) assistants radically increased during the last 7 years (see Table 6 on page 290 of the self-assessment report) the ratio of full and associate professors over the assistants decreased in a small amount (from 2.33 to 1.75). This can cause problems in the future (by retiring, great personal costs, lack of involved young teachers, etc.). The qualification of the teaching staff members broadly complies with the main requirements of this study programme and set forth in the regulatory enactments. Seems that the existent teaching staff may assure the accomplishment of all the aims and learning outcomes of this study programme. There are some academic staff members teaching an excessive number of disciplines. For example, a single teaching staff member is involved in 6 disciplines, as EEI781 Control and design of smart electrical transport, EEI489 Embedded Systems of Electrical Transport (study project), EEI289 Data base engineering technology in electrical transport, EEI298 Web technology and web-programming in electrical transport, EEI353 Electrical Transport Adaptive Systems Basics, EEI481 Programming Technologies in Industrial Electronics.

3. N/A

4. By studying the CVs of the teaching staff of this study programme it can be stated that their greatest part is involved in scientific research at FEEE. They are working also in the framework of several international and national projects, as well as industry funded ones. Upon our meeting with them, we concluded that the share of their teaching and research activity is varying from 30/70 to 50/50. Also, during the visit, experts were informed that they are trying to integrate their own research results in the study process.

5. The cooperation and collaboration mechanisms between the teaching staff is not emphasized in the self-evaluation report. It is stated, that an "annual review of the courses of the study programme takes place" to align the study content between different courses, but it is not provided practically how this is happening, what changes in the curricula were performed in the last years. The report also lacks the detailing of adequate procedures developed for ensuring the sustainability of the courses and their content when the change of the teaching staff occurs due to any reason.

## **Conclusions by specifying the strengths and weaknesses**

### Conclusions:

This section of the self-evaluation report is weakly written. Only few data are provided and most of the statements are not supported by adequate proofs. Therefore, this analysis was mostly performed by using other information sources, such as the CVs of the academic staff, the scientific publications summary and syllabuses of the belonging disciplines.

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in the teaching process in the frame of this study programme. During the previous period only few changes happened in the composition of the teaching staff, and these were resolved without diminishing the teaching quality. The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme.

The involvement of most of the teaching staff in advanced scientific research is praiseworthy. The number of the research projects they are involved in is great. The projects are international and national ones, and also based on agreements with industrial partners. It looks that the academic staff is effectively sharing their time among teaching and research.

Better cooperation and collaboration mechanisms between the teaching staff is needed to effectively align the study content between different courses.

### Strengths:

1. The high and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme;

### Weaknesses:

1. The high ratio of full and associate professors over the assistants, which can cause problems in the future, such as retiring, great personal costs, lack of involved young teachers.

2. The teacher's diversity is low since there are some academic staff involved in a large number of disciplines.

3. Not sufficient lectures are planned to be given to students by professionals from industry and teachers from foreign universities.

4. Annex "13.pielikums\_PROJEKTI\_2013\_2021" is not provided in English.

## **5. Assessment of the Compliance of the Study Programme "Computerised Control of Electrical Technologies"**

### **Requirements**

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

**Assessment of compliance:** Fully compliant

The diploma sample provided in SAR (Annex "RECO diploms ENG") fully complies with the procedure and regulations by which Latvian state-recognised documents of higher education are issued (Cab.Reg.No 202, <https://m.likumi.lv/doc.php?id=256157>).

The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202, however as it is a purely technical discrepancy with a few words being different, in experts opinion it does not affect the overall assessment of this criteria.

- 2 2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "Confirmation of the possibility for students to continue their education between the professional bachelor study programs "Adaptronics", "Computerised Control of Electrical Technologies" and "Smart Power Systems"", document No 01000-2.2.1-e/208).

- 3 3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "On compensation of losses in case the study program is not accredited, or the license of the study program is revoked, and a student does not wish to continue studies in another study program", document No 01000-2.2.1-e/178).

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the State Fee for Examining the Proficiency in the Official Language" (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex "On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/118).

- 5 5. 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.

**Assessment of compliance:** Not relevant

- 6 6. 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.

**Assessment of compliance:** Not relevant

- 7 7. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 "Mandatory Provisions to be Included in the Study Agreement" (SAR, Annex "Sample of Study Agreements").

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

The study programme is implemented only in Latvian. The study courses and study materials are provided both in Latvian and English.

All of these totally comply with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Institutions of Higher Education. Study course "EEI298 Web technology and web-programming in electrical transport" compliance with the legal requirements set forth in the Law on Institutions of Higher Education could not be evaluated as it was not added to study course list available to experts. In experts view, the absence of the description of this one study course would not influence the overall compliance to this criteria, as all of the other course descriptions were fully compliant.

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

**Assessment of compliance:** Fully compliant

According to the evidence provided as additional information by RTU (PS\_Elektroinženieris\_6LKI\_RECO (Only in Latvian)) the study programme fully complies with the valid professional standard in experts opinion.

The experts also had a chance to familiarize themselves with a report sent from LEEA No 2-4/603 (in Latvian - Latvijas Elektroenerģētiku un Energobūvnieku Asociācija). The report from LEEA states that, in their opinion, competencies and skills obtained in this programme need to be described more in depth in concordance with what is written in the renewed profession standard, therefore experts would suggest for the RTU representatives to get together with the association and talk through these points.

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully complies with the State Professional Higher Education Standard (Cabinet Regulations No 512) (SAR, Annex 6).

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

- 14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG\_jauns" and CV's of academic staff).

- 15 R5 - Overall rating

**Assessment of compliance:** Fully compliant

The study programme is fully compliant with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments. A few technical improvements could be in place. See more in recommendations regarding this study programme.

## **Requirements (R6-R8)**

- 1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

**Assessment of compliance:** Fully compliant

The study program is fully compliant with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes since RTU is assuring the following:

- a renewed library with a huge number of volumes and journals (also in electronic form) and an advanced information systems helping to find existing items;
- in the last years 13 laboratories have been totally upgraded and several advanced equipment

was acquired which can be used both in teaching and research;

- the government is financing the teaching of each student enrolled in this study field yearly with more than 4000€ (4405.04€ in the last academic year). Supplementary, FEEE is also attracting other funds for financing the education in this study field.

- 2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

**Assessment of compliance:** Fully compliant

The teaching staff of this study programme is fully compliant with the obligatory requirements clearly set forth in regulatory documents. Upon their CV, it can be stated that they have the compulsory qualification and experience in the topic of their courses. Cooperation both in education and research with Latvia's and abroad universities led to an improvement in technical knowledge of the implicated teaching staff. A more intensive involvement of academic staff from other universities, highly qualified specialists from companies could improve the quantity and quality of the taught technical knowledge.

- 3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

**Assessment of compliance:** Not relevant

## Conclusions by specifying the strengths and weaknesses

Conclusions:

The study programme formal indicators and their reflection in all the provided documentation totally corresponds to the existing regulations. The name of the study program, the issued degree, qualification and gained professional skills, the study programme aims and goals, outcomes to be achieved, and admission requirements are perfectly interrelated and mutually complementary.

The global impression upon the self-evaluation report and the organized meetings concerning this criterion of the expert team is positive. Some improvements must be done to make the course topics more attractive and close to the practical issues required by the companies hiring the graduates. More focus should be set on the feedback of the students and the results of the regular questionnaires.

There is a need to restructure the syllabuses of some (mainly the electrical machines related) courses.

The study programme is in line with the regulations and the good practices both in EU and Latvia. In general, the teaching process can guarantee the main aims of the programme and the achievement of the established learning outcomes.

RTU offers a great diversity of student mobility upon numerous cooperation agreements with foreign universities and companies. Unfortunately, only a small part of the students benefited from these excellent opportunities. The achieved learning outcomes during these foreign mobilities are recognized by RTU.

RTU offers the entire support for the high-quality education and research in this study field: financial, logistic, administrative. The involved teachers have at their hands everything needed for a high-quality teaching and research, as well the students for an effective learning.

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in the teaching process in the frame of this study programme. During the previous period only few changes happened in the composition of the teaching staff, and these were resolved without diminishing the teaching quality. The management staff should find the organizing

way and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme.

The involvement of most of the teaching staff in advanced scientific research is praiseworthy. The number of the research projects they are involved in is great. The projects are international and national ones, and also based on agreements with industrial partners. It looks that the academic staff is effectively sharing their time among teaching and research.

Better cooperation and collaboration mechanisms between the teaching staff is needed to effectively align the study content between different courses.

The "Computerised Control of Electrical Technologies" professional bachelor study programme is fully compliant with all the key points and requirements prescribed in the Law on Institutions of Higher Education and other regulatory enactments included in the tables from chapter 5 of this assessment report.

#### Strengths:

1. When the management staff initiated this study programme, they planned it in a way to be perfectly compliant with all the expectations and requirements prescribed in the Law on Institutions of Higher Education and other relevant regulatory enactments.
2. The way the greatest part of the self-assessment report was written. All indicators and formal attributes are well-specified at professional level, corresponding to the current regulations. The interrelation between components of indicative evaluation is visible and undoubted.
3. The mandatory internship to be performed for increasing the practical skills of the students;
4. The practical character of the diploma work;
5. Using the ORTUS portal for the easy accessibility of students to the required student surveys and a facile and flexible data processing;
6. Cooperation with foreign companies in hosting students for internships.
7. The budget used for educating yearly 1 B.Sc. student from this study program is increasing year by year;
8. The successful efforts made to develop the teaching and research infrastructure connected to this study programme;
9. The various ways of support of both education and research related to this study programme.
10. The high and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme;
11. The compliance with all the requirements stated in the law.

#### Weaknesses:

1. There are disciplines covering a very narrow segment of their topic;
2. During the organized meetings with actual and graduated students, they emphasized the need to better shape the content of the field specific professional study courses to the real industrial needs. These observations were general, without naming the courses in case.
3. There are a few technical discrepancies in the diploma sample. The introductory paragraph in the Diploma Supplement provided in English is not completely aligned with the Cabinet Regulations No 202.
4. Study course "EEI298 Web technology and web-programming in electrical transport" compliance with the legal requirements set forth in the Law on Institutions of Higher Education could not be evaluated.
5. Regarding the report sent from LEEA No 2-4/603 (in Latvian - Latvijas Elektroenerģētiķu un Energobūvnieku Asociācija) - it is written there that the competencies and skills obtained in this

programme need to be described more in depth in concordance with what is written in the renewed profession standard.

6. The high ratio of full and associate professors over the assistants, which can cause problems in the future, such as retiring, great personal costs, lack of involved young teachers.

7. The teacher's diversity is low since there are some academic staff involved in an large number of disciplines.

8. Annex "13.pielikums\_PROJEKTI\_2013\_2021" is not provided in English.

9. The decreasing number of students choosing this study programme.

10. Insufficient share of practical work in the syllabus of the courses.

12. Weak use of advanced technologies (especially simulation software) during the practical teaching activities with the students.

13. Some course contents are mixed up in the relationship with other ones (especially those of electrical machines). Overlaps among course contents could be identified.

14. Not sufficient lectures are planned to be given to students by professionals from industry and teachers from foreign universities.

## **Evaluation of the study programme "Computerised Control of Electrical Technologies"**

Evaluation of the study programme:

Good

## **6. Recommendations for the Study Programme "Computerised Control of Electrical Technologies"**

### **Short-term recommendations**

Until the hearing of the Study Quality Committee, study course "EEI298 Web technology and web-programming in electrical transport" description should be added to the other course descriptions.

Until the hearing of the Study Quality Committee, the introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202.

In 2 years time better shape the content of the given field related professional study courses to the real industrial approaches and needs.

In 2 years time include more practical work in the syllabus of the disciplines and use more up-to-date technologies (especially simulation software) during the practical teaching activities with the students.

In 2 years time improve the course contents since some of them have content mixed up in the relationship with other ones, while also certain overlaps among courses exist.

In 2 years time wider the coverage of the disciplines dealing with a very narrow segment of their topic.

In 2 years time find the organizing means and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

Until the next admissions procedure starts for the students experts would suggest for the RTU representatives to get together with representatives of LEEA and talk through these points mentioned in the letter (No 2-4/603) with the association.

In 2 years time try to involve more teaching staff to reduce the number of courses offered by a single teacher.

### Long-term recommendations

Until the next accreditation more effective advertisement should be needed to attract more (preferably very good) students for this study programme to stop the decrease of the involved students.

Until the next accreditation gradually integrate talented and devoted young specialists in the academic staff to increase the human resources sustainability and help them to be involved in research projects to be make more attractive the academic career.

## II. "Adaptronics" ASSESSMENT

### II. "Adaptronics" ASSESSMENT

#### 1. Indicators Describing the Study Programme

##### Analysis

Professional master study programme Adaptronics, has been developed by RTU in order to fulfill the needs of modern industry, considering the modern technological advancements and interdisciplinarity. It is a logical follow-up to the bachelor study programme, bearing the same name. The programme aims to provide students with the opportunity to improve theoretical and professional knowledge, develop professional, creative and research skills, work with modern adaptive systems in the field of electrical engineering, electronics, power engineering, mechatronic system automation. The study programme, especially its name, is unique in the European context as similar programmes exist only in few universities.

Documents state that the study programme is offered in several options:

- Full time studies - 1 years, 6 months - latvian/english
- Full time studies - 2 years - latvian/english
- Full time studies - 2 years, 6 months - latvian/english
- Part time studies - 2 years - latvian/english
- Part time studies - 3 years - latvian/english
- Part time extramural studies - 2 years - latvian/english
- Part time extramural studies - 3 years - latvian/english

The self-evaluation report states that from these variants of implementation 2 years, 6 months for full-time studies, 3 years for part-time studies, are not licensed and are waiting for the approval of the new professional standard. At the time the self-evaluation report was written, the current professional standard for this programme was still developed, however, as additional information experts were provided with a comparison with the approved one with which the programme is in compliance with. The admission to these variants is designed as follows:

- 1 year, 6 months for full-time studies, 2 years for part-time studies, for applicants with a professional Bachelor degree in Adaptronics and qualification of Electrical engineer, possibility to obtain a Professional Master Degree in Adaptronics and Qualification of Leading Electrical Engineer;
- 2 years for full-time studies with recognized previous education, 2 years, 6 months for part-time studies, for applicants with a professional Bachelor degree or equivalent education in electrical engineering, power engineering, mechatronics and electronics and qualification of electrical engineer, possibility to obtain a Professional Master Degree in Adaptronics and Qualification of

Leading Electrical Engineer;

· 2 years, 6 months for full-time studies, 3 years for part-time studies, for applicants with an academic Bachelor degree in engineering, possibility to obtain a Professional Master Degree in Adaptronics and Qualification of Leading Electrical Engineer.

The knowledge of English is tested for applicants to study in English.

It is planned to admit 20-25 students totally in Latvian and foreign groups for full time studies of the program implementation. The envisaged minimum number of students in each version is 5.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions: The programme is unique and looking in the future, aiming to be a strong interdisciplinary professional programme embedding to itself elements of different specializations and disciplines. As the programme has just started and admitted students for the first time, it is hard if not impossible to assess the real feelings of the students to their expectations of the programme and its content.

Strengths:

1. Uniqueness of the programme in European context.
2. Logical follow-up to the „Adaptronics“ Bachelor programme.
3. Variants designed to be admitted having other previous education than “Adaptronics” (electrical science, energy, electronics and automatics or comparable education).

Weaknesses:

None identified.

## **2. The Content of Studies and Implementation Thereof**

### **Analysis**

2.1 The descriptions of study courses and modules are understandable. There is a good practice of using industry input for the final theses from other programmes, which is combined with the internship or traineeship, which the students are taking in industry during their studies. It can be assumed that the same practice is followed in the given programme, however, as the admission has just started, there are no real possibilities to assess the reality of the matter.

The volume of the programme and the duration of studies are different for students with different previous education:

60 CP - 1 year, 6 months for full-time studies with previous education in adaptronics, 2 years for part-time studies

80 CP - 2 years for full-time studies with recognized previous education, 2 years, 6 months for part-time studies

100 CP - 2 years, 6 months for full-time studies with academic education in engineering, 3 years for part-time studies (implementation is possible after licensing)

All variants include compulsory study courses, elective courses, internship and state examination, including a Master's thesis. As a result of professional studies, students acquire knowledge and professional competence that meet the requirements of a professional Master degree and allow them to start professional activities corresponding to the specialty.

The programme is well built, involves subjects of most areas, that the term of “Adaptronics” is containing. There seems to be a confusion with the active number of students participating in the freshly opened study programme. This leads the students to the feeling that they are „alone” without real other colleagues on the programme. In a longer perspective, this could be a hindering aspect to the popularity of the study programme. Also, the low number of active students can be an

issue for the effective usage of the resources as well as the real gaining of learning outcomes for the students.

During the meeting with RTU representatives it was found that there is not a fixed minimum number of the students admitted to the study programme, set by the university, upon which the opening of the programme in annual basis is decided. Such minimum number of students for annual admission in order to open the studies should be fixed, as this would help to plan the better use of resources, plan the time of the teachers as well as yields to ensuring the study outcomes for the students.

2.2 The study implementation methods are modern, the laboratory facilities used for the studies are well equipped and integrated to the study programme. There is a good amount of materials available for the students, including the digital learning possibilities.

In order to satisfy the requirements defined in the programme and every course, in comparison to full time studies, a longer time for completing the program and a lower number of credit points is set for half-time studies, in particular, less than 40 CP per academic year and less than 40 academic hours per week. As full-time students have less practical experience in the field of study, the applied methods include study trips to the industry companies, visiting lectures by the industry professionals, etc. As regards half-time students, who have practical experience in most cases, the employed teaching methods consist more of lectures, practical assignments, group works, home assignments and research involving case studies and their explanation from both the theoretical and practical perspective. Within the half-time in person and half-time remote study process the focus is on the independent work of students by using both the problem-based learning and case studies, as well as the professor's advisory role.

The student-focused education principles are considered during the whole implementation of the study process, including involvement of students in the study process and content improvement, involving different study methods from project-based learning, teamwork and peer-to-peer approach, flexibility in choosing the form of studies and combining it with work, etc. Mobility and extracurricular activities are also offered to students.

2.3 The ORTUS portal is used to conduct surveys amongst students, results of which are made available to the head of the programme as well as the related staff of the study courses. Necessary improvements are made according to results and results are considered in the process of teaching staff promotion for vacancies. Feedback is also gathered from employers, where the focus is set on the evaluation of the trainees at the internship, as well as graduates, with emphasis on reflection of the studies vs the skills and knowledge needed in the work environment.

As the enrollment to the programme just started in 2021 and programme opened for the study year 2021/2022, there is no real evidence or examples yet available about the survey results concerning this particular study programme.

2.4 Students are well aware of the mobility possibilities, especially valuing the possibilities of international internships and the experience gained from these actions.

Most of the mobility is carried out using ERASMUS+ programme, where upon applying, students have to choose the curriculum and courses according to needed learning outcomes. The selected courses and study plan are approved by the head of the study programme. Recognition of study courses covered during mobility takes place according to the "Amendments to the Organisation Procedure of Erasmus+ Student Mobility" (Resolution of RTU Vice-Rector for Academic Affairs No. 01000-1.1/240 as of 29 October 2014) and "Regulation on the Recognition of the Courses Completed at Other Universities and RTU Study Programmes" (Resolution of RTU ViceRector for Academic Affairs No 02000-1.1/29 as of 4 April 2016). The recognition of ERASMUS+ mobility is carried out by the head of the study programme on the basis of the Transcript of Records submitted by the student

after the ERASMUS+ mobility and a pre-signed application for the recognition of study courses.

## **Conclusions by specifying the strengths and weaknesses**

Conclusion:

The content of studies is well structured and is compliant to the aims and outcomes of the programme. The study related infrastructure, databases and e-channels are of a high level. Mobility possibilities are known by students and the ones that have used them cherish their experience. There seems to be a lack of actively participating students, relying on the conducted interviews by the expert group.

Strengths:

1. Study related infrastructure, laboratories, e-learning environments and digital sources are in very good condition and available for the students.
2. Students are well aware of the mobility possibilities and cherish the experiences especially in the part of international internship possibilities.
3. Variations between the common background profiles of full-time and part-time students are taken into account and student-centered approach is offered.

Weaknesses:

1. Low number of active students on the programme, which can be understandable as the programme just opened, yet, it would be wise to set a minimum number of students for annual admission, which must be fulfilled in order to open the studies. This helps to use the resources wisely, plan the time of the teachers as well as yields to ensuring the study outcomes for the students.

## **3. Resources and Provision of the Study Programme**

### **Analysis**

3.1. State budget subsidy for students of the professional master study programme "Adaptronics" amounts to EUR 194 007.59, the tuition fee amounts to EUR 24 904.00. The total sum amounts to EUR 218 911.59 or EUR 6 060.99 per student.

In order to improve the resource base, additional financing from contractual work conducted by the faculty units is attracted. Staff, involved in the studies, is assuring the adequate educational support for the students, as well as management of the study programme, undertaking study support processes (organization of study process, management of public and international relations, student records, technical support of study programmes, work related to the implementation of the study programme, etc.). By using funds for the European Regional Development Fund (ERDF) and research projects in the field of Power Industry, Electrical Engineering and Electrical Technologies, since 2014 the study process has been implemented in a new and modern building with an up-to-date building management system. It should be mentioned that laboratories have been totally upgraded during the last years. The list of the recently acquired new equipment is long and comprises modern units to be used both teaching and research. A renewed library with advanced information systems is waiting for the students to enrich their knowledge, but also the academic staff to access the novelties in their fields. The RTU Research Support Fund provides significant financial support for a great variety of research related activities (such as support for maintenance of research equipment, protection and licensing of intellectual property, publishing of scientific journals, participation and organization of scientific conferences, etc.), which enables a successful activity for the involved researchers. Both teachers and students have access to the highly valuable international scientific databases (as SCOPUS, WoS or the most important in this field, IEEEXplore) by the subscription

contracts that are concluded directly with the supplier or through the "Cultural Information Systems Centre" Latvian state agency.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

RTU offers the support for the high-quality education and research in this study programme: financial, logistic, administrative, etc. Involved staff have at their hands everything needed for high-quality teaching and research, as well the students for effective learning.

Strengths:

1. The budget used for educating students in the study program is adequate and additional financing from contractual work conducted by the faculty units is attracted.
2. Successful efforts made to develop the teaching and research infrastructure connected to this study programme.
3. Various ways of support of both education and research related to this study programme.
4. Study related infrastructure, laboratories, e-learning environments and digital sources are in very good condition and available for the students.

Weaknesses:

1. None identified

## **4. Teaching Staff**

### **Analysis**

The meetings the expert group concluded that both RTU and FEEE assumes adequate methods in a target-oriented manner to avoid quality decreasing of the teaching process within the study programme. Academic staff from partner universities abroad are invited to participate in the implementation of the study programme, as well as industry professionals provide classes that are orientated more towards practical tasks.

The qualification of the teaching staff members broadly complies with the main requirements of this study programme and set forth in the regulatory enactments. The compulsory part and the limited electives part of the study programme are implemented by 11 professors and associate professors with many years of experience in electrical engineering, electronics, process automation and other fields related to the study programme, who have been elected to academic positions at RTU structural units and are experts in their field approved by the Latvian Council of Science, as well as their scientific and pedagogical qualification complies with the criteria specified for the scientific and pedagogical qualification. Experienced professors and lecturers as well as PhD students and young post-doctoral researchers are involved in teaching. According to the aims of the study programme, the primary criteria for the selection of academic staff are (a) knowledge of the latest technologies and participation in scientific and research projects in their fields, (b) pedagogical skills relevant to current trends in the field, and (c) experience in academic courses to foreign students in English.

In order to ensure the quality of the study content, the academic staff involved regularly improve their professional and academic knowledge at methodological seminars, conferences (national and international), as well as in scientific and research work, and participate in various scientific and methodological projects. Among those are research-oriented ERDF (European Regional Development Fund), FLPP (Fundamental and Applied Research Projects), as well as ERASMUS+ projects, through which new courses and textbooks are developed. The results of the projects are regularly reported in conference and journal publications and used in their pedagogical work - lectures, seminars, other

activities with students, as well as in academic tools and monographs. Many of the graduation papers are written in the framework of the projects, their activities and results. Upon the expert group meeting with the teaching staff, it was concluded that the share of their teaching and research activity is varying from 30/70 to 50/50.

There is a survey mechanism in place, whereupon feedback, changes in courses, modules or programme in general can be made. Several examples have been listed in the SAR and during the on-site visit, where the opinion or suggestion from one of the involved stakeholders have been considered and changes have been made either to a study course or the programme structure in general. The proposal for changes in a programme or study course can come from either side - student self-government, surveys, industry. Any proposed developments of a study program are examined and approved by the Committee of the Study Direction. The evidence of this consecutive procedure being established was also found during the on-site visit by the expert group. In order to ensure integration among the study courses, each year all study courses are checked for compliance. Seminars are organized, where the academic staff implementing the study programme inform colleagues on the themes of the study courses, teaching methodology and discuss improvements that would ensure high quality of the curriculum of the study programme and make it in line with the topicalities of the respective field. Although the self evaluation report mentions that the measures have been taken to involve international academic and industrial specialists in the study work, interviews with the students reflect that this number has been low and a more active involvement of visiting lecturers is expected by them.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in the teaching process in the frame of this study programme. Changes in the composition of the teaching staff are resolved without diminishing the teaching quality. The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field.

The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme. The involvement of most of the teaching staff in advanced scientific research is praiseworthy. The number of the research projects they are involved in is great. The projects are international and national, and also based on agreements with industrial partners. It looks that the academic staff is effectively sharing their time among teaching and research.

Strengths:

1. High and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme.
2. Teaching staff at this moment is a good mix of experienced senior members and ambitious younger colleagues with great perspectives.

Weaknesses:

1. Regular involvement of industrial experts could be enhanced.

## **5. Assessment of the Compliance of the Study Programme "Adaptronics"**

### **Requirements**

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

**Assessment of compliance:** Fully compliant

The diploma sample provided in SAR (Annex "REGAO diploms ENG") fully complies with the procedure and regulations by which Latvian state-recognised documents of higher education are issued (Cab.Reg.No 202, <https://m.likumi.lv/doc.php?id=256157>).

The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202, however as it is a purely technical discrepancy, the experts do not think it should influence the overall evaluation of this criteria.

2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation

(SAR, Annex "Confirmation of the possibility for students to continue their education between the professional master study programs "Adaptronics", "Computerised Control of Electrical Technologies" and "Smart Power Systems"", document No 01000-2.2.1-e/71).

3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "On compensation of losses in case the study program is not accredited, or the license of the study program is revoked, and a student does not wish to continue studies in another study program", document No 01000-2.2.1-e/178).

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the State Fee for Examining the Proficiency in the Official Language" (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex "On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/118).

5. 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.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Vice-Rector's for Academic Affairs confirmation (SAR, Annex "On the foreign language knowledge of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/117).

- 6 6. 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.

**Assessment of compliance:** Not relevant

- 7 7. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 "Mandatory Provisions to be Included in the Study Agreement" (SAR, Annex "Sample of Study Agreements").

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Partially compliant

Study course descriptions are partially in compliance with the Law on Institutions of Higher Education Section 56.1, Paragraph two. The experts could not evaluate the study course descriptions EEI716, EEI721, EEI715, EEI786 as they were missing from the annex. The study course plan does not include the compulsory amount of Latvian language studies for foreign students dictated in the Law on Institutions of Higher Education Section 56.

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

**Assessment of compliance:** Fully compliant

According to the evidence provided as additional information by RTU (PS\_Vadosais\_elektroinzenieris\_7LKI\_REGA) the study programme fully complies with the valid professional standard in experts opinion.

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Partially compliant

Partially complies with the State Professional Higher Education Standard (Cabinet Regulations No 512). The following discrepancies were found:

- 1) The explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education is missing.
- 2) The amounts of the compulsory, limited optional and free of choice part of the study programme and the distribution of credit points between them is not defined.
- 3) Opportunities for students who have not acquired the relevant knowledge in the previous study programme to acquire study courses that ensure the achievement of professional competences in business have not been defined.
- 4) Admission requirements with an indication of the English language test for students who will study the study programme in English are not defined.  
(SAR, Annex 6 "Atbilstība Valsts izglītības standartam REGA0\_EN")

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

- 14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG\_jauns" and CV's of academic staff).

- 15 R5 - Overall rating

**Assessment of compliance:** Partially compliant

The study programme is partially compliant with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments. A few other technical improvements could be in place. See more in recommendations regarding this study programme.

## Requirements (R6-R8)

- 1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

**Assessment of compliance:** Fully compliant

The study program is fully compliant with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

There is a modern library with printed and electronic resources, advanced information systems helping to find existing items and supporting e-learning.

In the last years many laboratories have been fully upgraded and several advanced equipment has been acquired, cross-usable in teaching and research.

The government subsidy per student is more than EUR 6000 and additional financing from contractual work conducted by the faculty units is attracted.

- 2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

**Assessment of compliance:** Fully compliant

The teaching staff is compliant with the obligatory requirements set forth in regulatory documents. Upon self-evaluation report, it can be stated that they have the compulsory qualification and experience in the topic of their courses. They are sharing their time in teaching and research, bringing the research into teaching activities as well.

- 3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

**Assessment of compliance:** Fully compliant

Many of the graduation papers are written in the framework of research projects and on the scientific activities and results of the projects.

## Conclusions by specifying the strengths and weaknesses

Conclusions:

The "Adaptronics" professional master study programme is partially compliant with all the key points and requirements prescribed in the Law on Institutions of Higher Education and other regulatory enactments included in the tables from chapter 5 of this assessment report.

The conducted interviews implied that might be an issue with the low number of active students participating in the freshly opened study programme. This leads the students to the feeling that they are „alone“ without real other colleagues on the programme. In a longer perspective, this could be a hindering aspect to the popularity of the study programme. Also, the low number of active students can be an issue for the effective usage of the resources as well as the real gaining of learning outcomes for the students.

From all the offered study variants, the self-evaluation report states that 2 years, 6 months for full-time studies, 3 years for part-time studies, are not licensed and are waiting for the approval of the new professional standard (which is approved by today). This issue must be resolved, if the desire is to continue this variant of studies.

The programme is unique and looking in the future, aiming to be a strong interdisciplinary professional programme embedding to itself elements of different specializations and disciplines. As the programme has just started and admitted students for the first time, it is hard if not impossible to assess the real feelings of the students to their expectations of the programme and its content.

The content of studies is well structured and is compliant to the aims and outcomes of the programme. The study related infrastructure, databases and e-channels are of a high level. Mobility possibilities are known by students and the ones that have used them cherish their experience. There seems to be a lack of actively participating students, relying on the conducted interviews by the expert group.

RTU offers the support for the high-quality education and research in this study programme: financial, logistic, administrative, etc. Involved staff have at their hands everything needed for high-

quality teaching and research, as well the students for effective learning.

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in the teaching process in the frame of this study programme. Changes in the composition of the teaching staff are resolved without diminishing the teaching quality. The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field.

The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme. The involvement of most of the teaching staff in advanced scientific research is praiseworthy. The number of the research projects they are involved in is great. The projects are international and national, and also based on agreements with industrial partners. It looks that the academic staff is effectively sharing their time among teaching and research.

#### Strengths:

1. Uniqueness of the programme in European context.
2. Logical follow-up to the „Adaptronics“ Bachelor programme.
3. Variants designed to be admitted having other previous education than “Adaptronics” (electrical science, energy, electronics and automatics or comparable education).
4. Study related infrastructure, laboratories, e-learning environments and digital sources are in very good condition and available for the students.
5. Students are well aware of the mobility possibilities and cherish the experiences especially in the part of international internship possibilities.
6. Variations between the common background profiles of full-time and part-time students are taken into account and student-centered approach is offered.
7. The budget used for educating students in the study program is adequate and additional financing from contractual work conducted by the faculty units is attracted.
8. Successful efforts made to develop the teaching and research infrastructure connected to this study programme.
9. Various ways of support of both education and research related to this study programme.
10. High and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme.
11. Teaching staff at this moment is a good mix of experienced senior members and ambitious younger colleagues with great perspectives.

#### Weaknesses:

1. Low number of active students on the programme, which can be understandable as the programme just opened, yet, it would be wise to set a minimum number of students for annual admission, which must be fulfilled in order to open the studies. This helps to use the resources wisely, plan the time of the teachers as well as yields to ensuring the study outcomes for the students.
2. The study course plan does not include the compulsory amount of Latvian language studies for foreign students dictated in the Law on Institutions of Higher Education Section 56.
3. Study course descriptions EEI716, EEI721, EEI715, EEI786 are missing from the information available to experts.
4. The introductory paragraph in the Diploma Supplement provided in English is not fully aligned with the Cabinet Regulations No 202.
5. The study programme is not fully compliant with the State Professional Higher Education Standard.

6. Regular involvement of industrial experts could be enhanced.

### **Evaluation of the study programme "Adaptronics"**

Evaluation of the study programme:

Good

### **6. Recommendations for the Study Programme "Adaptronics"**

#### **Short-term recommendations**

Until the hearing of the Study Quality Committee, study course EEI716, EEI721, EEI715, EEI786 descriptions should be added to the other course descriptions.

Until the hearing of the Study Quality Committee, a Latvian language study course for foreign students as well as a study course dictated by Environmental Protection Law and Civil Protection Law should be added to the study course plan.

Until the hearing of the Study Quality Committee, the introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202.

Until the hearing of the Study Quality Committee, the explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education, should be defined.

Until the hearing of the Study Quality Committee, the distribution of credit points for the compulsory, limited optional and free of choice part of the study programme, as well as the specific courses belonging to each of the aforementioned parts should be defined.

Until the hearing of the Study Quality Committee, opportunities for students who have not acquired the relevant knowledge in the previous study programme to acquire study courses that ensure the achievement of professional competences in business should be defined.

Until the hearing of the Study Quality Committee, admission requirements with an indication of the English language test for students who will study the study programme in English should be defined.

In 2 years time a minimum amount of annual admission of students in order to open the programme should be defined.

Planned study variant 3 (2 years, 6 months for full-time studies, 3 years for part-time studies) should be licensed.

#### **Long-term recommendations**

## **II. "Computerised Control of Electrical Technologies" ASSESSMENT**

### **II. "Computerised Control of Electrical Technologies" ASSESSMENT**

#### **1. Indicators Describing the Study Programme**

##### **Analysis**

The expert group named by AIKA carefully analysed the self-assessment report provided by the RTU. Supplementary information was gained from the RTU webpage and the discussions with the staff members, involved students, graduates and employers.

As concerning the imposed formal requirements, the study programme corresponds to all of them.

The study programme "Computerised Control of Electrical Technologies" at master level is implemented in several forms, all of them both in Latvian and English:

- full-time studies: 1 year - 40 CP (Latvian local credits) and 2 year - 80 CP;

- part time extramural studies: 1 years, 6 months - 40 CP and 2 years, 6 months - 80 CP.

The students graduating these programmes all will gain "Professional Master Degree in Electrical Engineering" and a "Leading Electrical Engineer" qualification.

The tasks of the study programme (lectures, practical classes, laboratory works and projects to acquire in depth knowledge in electrical engineering and to gain skills in the basics of scientific research work, and also in profound knowledge in economic, social and pedagogical issues) all are clearly stated in the provided self-assessment report.

The name of the study programme - Computerised Control of Electrical Technologies is expressive, totally covering its main objectives and the learning outcomes.

The admission requirements (professional bachelor degree in electrical engineering, energy or electronics, and qualification of electrical engineer or comparable education and 5th level professional qualification) are in line with the basic needed knowledge for pursuing all the disciplines foreseen to achieve the 6th professional qualification level - Leading electrical engineer. The knowledge of English is tested for applicants for studies in English.

The aim of the professional master study programme is to provide higher professional education, and to prepare high level specialists with engineering qualification and master degree, who would be able to formulate and solve complex electrical equipment automation tasks in various economic sectors, at research institutions and companies, as well as perform pedagogical activities. Graduates will have the possibility to later pursue a Ph.D. degree.

The admission requirements for potential candidates are the followings: professional bachelor degree in electrical engineering, energy or electronics, and supplementary qualification of electrical engineer, or comparable education and 5th level professional qualification

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The study programme formal indicators and their reflection in all the provided documentation perfectly correspond to the existing regulations. The name of the study program, the issued degree and gained professional skills, the study program aims and goals, outcomes to be achieved, and admission requirements are perfectly interrelated and mutually complementary.

Strengths:

1. The way the greatest part of the self-assessment report was written;
2. All indicators and formal attributes are specified at professional level, corresponding to the current regulations. The interrelation between components of indicative evaluation is visible and undoubted;
3. All the recommendations from the former accreditation regarding the changes in the study plan were performed;
4. During the discussions a good relationship between staff, students, graduates and employers was noticed;
5. The great diversity of knowledge and professional skills offered to the master level students which enables them to have a good position in the local labour market or to continue their studies at doctoral level.

Weaknesses:

1. Low number of students enrolled in this study programme.

## **2. The Content of Studies and Implementation Thereof**

### **Analysis**

1. In the self-assessment report the descriptions of all the taught disciplines, the mandatory internship and the final M.Sc. thesis are sufficiently detailed. All of these are perfectly in accordance with the mandatory regulations. In most of the cases, the content of the courses is pertinent and totally in accordance with the main aims of this master study programme. Some complementary feature between the courses can be identified. Both the current and graduated students emphasized the need of more practice approach of the courses and the use of modern software products used in this field. From the students' perspectives the current improved curricula offer a real chance to accomplish all the foreseen learning outcomes, and consequently to have the specific skills required on the labour market.

The volume of the 1st variant of this professional master study programme is 40 CP, which comprises of study courses (14 CP), internship (6 CP), and the state examination (20 CP), part of which is the development and public presentation of the Master Thesis. In the frame of the 2nd variant of the professional master study programme the graduates can earn 80 CP, which consists of study courses (24 CP), internship (26 CP), and the final state examination (30 CP). The last 30 CP can be gained by the development and public presentation of an engineering project (10 CP) in the 1st study year, and the development and public presentation of the Master Thesis (20 CP) in the final study year. The subject and tasks of the mandatory internship are imposed in accordance with the professional degree and qualification to be obtained after graduating this study programme.

There are concerns about the title and the content of some courses. While most of the disciplines are offering a wide knowledge about the given topics, there are some courses, like "Artificial neural networks in electric transport control" (EEI782) and "Genetic algorithms in electrical transport optimal control" (EEI783), which are excessively focusing only on a specific application of the given field (electric transport control), which may limit the knowledge gained by the master students undertaking the courses.

2. The six learning outcomes of the study programme were well-planned. All of them are pertinent and in the professional standard required for the "Leading Electrical Engineer" qualification. The aims of the tasks are also closely linked to these outcomes.

The RTU established the Golden Fund of graduates (also for those at master level), which includes the most outstanding graduates of RTU study programmes, based on academic achievements and social activities. This is an excellent way to encourage for achieving high performances the students. It was interesting to find out the future career of the awarded former master students from this study programme.

FEEE is strongly focusing on the improvement of the student-focused education within its study fields. In the self-assessment report 8 principles are listed for achieving this educational goal.

The assessment of the students' knowledge is a complex process and it is strictly regulated at RTU. At this study programme the study outcomes are effectively assessed based on two criteria, in particular, the quality criterion (the assessment according to a scale of 10 points) and quantity criterion (credit points, obtaining positive assessment of acquiring the study course content). An exam and test are the basic forms of assessment of acquisition of the programme and the students need to take at the completion of every study subject. A special focus is set on the defence of the Master thesis.

The main aims of the mandatory internship fully correspond to the aims and learning outcomes of the given study programme. These are planned as to encourage master students to apply and

develop extra knowledge, skills and competencies acquired during studies.

Unfortunately, in some cases, the recommended literature in the syllabus of the courses taught also in English comprises exclusively or partially Latvian resources, incomprehensible for foreign students.

During the organised meetings, both the actual and graduated students emphasized the need to better fit the content of the courses to the real industrial needs.

3. Upon the "Regulation on the Assessment of Learning Outcomes" every year, in both semesters RTU Office of Vice-Rector for Academic Affairs regularly conducts student surveys on the ORTUS portal also for master level students. Even if the ratio of those responding to this request is small, the outcomes are considered, and there are also used in improving the quality of teaching.

Upon the Annex 15 of the self-evaluation report, in the last period the results of graduate surveys show that during the studies, future professionals gained good theoretical knowledge and high-qualification skills needed to work in industry. 90% of respondents are satisfied with the selected study programme and the quality of studies. 90-95% work in the field of power and electrical engineering, electronics, automation (or other related fields).

4. As the expert group found out from the meetings, a great diversity of incoming and outgoing foreign mobility opportunities is available for the students of this study programme. Cooperation with numerous foreign universities and companies exists, most of them in the frame of the ERASMUS+ programme. The learning achievements are regularly recognised by RTU.

The external mobility possibilities are promoted is a great variety by RTU. Practically it is impossible that a student don't get information from at least one source. Despite of having it, there are several students not interested in external mobility actions. The main reason, as we concluded upon the meetings with the master students and graduates, is that most of them are already working during their master studies, and they cannot leave their jobs for a longer period. This is underlined also of a result of the survey performed by the master students, from which results that 100% of them are working during their master studies (see Annex 15).

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The global impression upon the self-evaluation report and the organized meetings concerning this criterion of the expert team is positive. Some improvements must be performed for making the course syllabus more attractive and closed to the practical issues required by the companies hiring the graduates. Also, the share of practical works should be increased. More focus should be set on the feedback of the students and the results of the regular questionnaires. The study programme is in line with the regulations and the good practices both in EU and Latvia. In general, the teaching process can guarantee the main aims of the programme and the achievement of the established learning outcomes. RTU offers a great diversity of student mobilities upon numerous cooperation agreements with foreign universities and companies. Unfortunately, only a small part of the students benefited of these excellent opportunities. The achieved learning outcomes during these foreign mobilities are recognised by RTU.

Strengths:

1. The intention of the management staff to permanently improve the curricula and the content of the courses of this study programme;
2. The special importance given to the obligatory internship to be performed for reinforcing theoretical knowledge and gaining more practical experience in the given field;
3. The establishing of the Golden Fund of graduates at RTU to reward the most outstanding

graduates of RTU study programs;

4. The correct and well-established assessment method of the students' knowledge during their master study;
5. The inclusion of representatives of the industry in the State Examination Committee analysing the master theses;
6. The use of the ORTUS portal for the easy accessibility of students to the required student surveys and a facile and flexible data processing;
7. The well-elaborated study outcomes assessing system;
8. Cooperation with local companies in hosting students for internships;
9. The topics of the final master theses of the students cover a great variety of topics and also multidisciplinary subjects can be identified.

Weaknesses:

1. There are disciplines covering a very narrow segment of their topic;
2. In several cases the recommended literature in the syllabus of the courses taught also in English comprises exclusively or partially Latvian resources, incomprehensible for foreign students;
3. During the organised meetings both the actual and graduated students emphasized the need to better fit the content of the courses to the real industrial needs. These observations were general, without naming the courses in case;
4. The self-assessment report focuses on the general benefits and requirements of the mandatory internships rather on presenting where these internships were performed (as it is provided in the case of the external mobilities) and the evaluation of the achieved knowledge during them.

### **3. Resources and Provision of the Study Programme**

#### **Analysis**

1. As concerning the material support of the master students from the "Computerised Control of Electrical Technologies" study programme, it is adequate and it is constantly increasing during the last years. It is not clear how this was possible: by the increase of the income from the budget or by attracting more other funds? In the last academic year, the funding for a single master student was 6607.56€.

14 members of the academic staff - teachers are assuring the adequate educational support for the master students from this study programme. The general staff at RTU are totally involved in the management of the study programme that undertake study support processes (organization of study process, management of public and international relations, student records, technical support of study programmes, work related to the implementation of the study programme, etc.). it should be mentioned, that the budget used for educating yearly 1 M.Sc. student from this study programme is yearly increasing. By using funds of the European Regional Development Fund (ERDF) and research projects in the field of Power Industry, Electrical Engineering and Electrical Technologies, since 2014 the study process has been implemented in a new and modern building (seen during the on-line visit) with an up-to-date building management system. It should be mentioned that 12 laboratories (also visited) have been totally upgraded during the last years. The list of the recently acquired new equipment is also impressive and comprises of modern units to be used both teaching and research. A renewed library with advanced information systems is waiting the students to enrich their knowledge, but also the academic staff to access the novelties in their fields. The RTU Research Support Fund provides significant financial support for a great variety of research related activities (such as support for maintenance of research equipment, protection and licensing of intellectual property, publishing of scientific journals, participation and organization of scientific conferences, etc.), which enables a successful activity for the involved researchers. Both teachers and students have access to the highly valuable international scientific databases (as SCOPUS, WoS

or the most important in this field, IEEEExplore) by the subscription contracts are concluded or directly with the supplier, or through the "Cultural Information Systems Centre" Latvian state agency.

A centralized study management system is used for the efficient administration of the study process, which ensures advanced digital provision of the study life cycle. To ensure effective implementation of the study process, also Moodle e-learning system is used, where all relevant information is compiled in an automated way (study courses, users, groups, access rights, etc.). This system ensures a very good student-instructor communication. 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 request for documents (references, transcripts of records, copies of a learning agreement, etc.).

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

RTU offers the entire support for the high-quality education and research in this study field: financial, logistic, administrative. The involved teachers have at their hands everything needed for a high-quality teaching and research, as well the students for an effective learning.

Strengths:

1. The budget used for educating yearly 1 M.Sc. student from this study programme is yearly increasing;
2. The successful efforts made to develop the teaching and research infrastructure connected to this study programme;
3. The various ways of support of both education and research related to this study programme.

Weaknesses:

None identified.

## **4. Teaching Staff**

### **Analysis**

1. Upon the meetings it seems that there exist methods assumed by RTU and FEE to avoid quality decreasing of the teaching process within the study programme.

During the evaluation period, five young academic staff members were appointed, which is the key to sustaining in the future the high-level of the teaching staff. A stronger involvement of leading industry professionals and of lecturers from foreign universities should be expected.

2. The qualification of the teaching staff members broadly complies with the main requirements of this study programme and set forth in the regulatory enactments. Seemly, the existing teaching staff may assure the accomplishment of all the aims and learning outcomes of this study programme, but for the sustainability of the human resource talented and devoted young specialists should be integrated in the academic staff.

During the reporting period, the involved academic staff was actively involved in international cooperation mobility programmes, mainly in the frame of the ERASMUS+ programme.

More lectures/presentations organized by the involvement of top industry professionals and teachers from foreign universities could improve the teaching process.

3. N/A

4. The greatest part of the teaching staff of this study programme is involved in scientific research at FEE. They are working also in the frame of several international and national projects, as well of industry funded ones. Upon our meeting with them, we were informed that they are trying to integrate their own research results in the study process. The academic staff members should be better stimulated to publish their research results internationally in high ranked journals.

5. The cooperation and collaboration mechanisms between the teaching staff is weakly treated in the self-evaluation report. It is stated, that an "annual review of the courses of the study programme takes place" to align the study content between different courses, but it is not provided practically how this is happening, what changes in the curricula were performed in the last years. The report also lacks the detailing of adequate procedures developed for ensuring the sustainability of the courses and their content when the change of the teaching staff occurs due to any reason.

### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The study programme has a relatively young teaching staff. The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme.

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in teaching process in the frame of this study programme.

The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

The involvement of most of the teaching staff in advanced scientific research is laudable. The number and variety of the research project they are involved is great. These projects are funded by international and national agencies and by industrial partners.

Better cooperation and collaboration mechanisms between the teaching staff is needed to effectively align the study content between different courses.

Strengths:

1. The high and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme;
2. Momentary the academic teaching staff involved in this master study programme is a good mix of very experienced senior members and young people recently obtained the Ph.D degree.

Weaknesses:

1. The methods assumed by RTU and FEE to avoid quality decreasing of the teaching process within the study programme are not sufficiently addressed in the self-assessment report;
2. Few lectures/presentations are organized by the involvement of top industry professionals and teachers from foreign universities.

## **5. Assessment of the Compliance of the Study Programme "Computerised Control of Electrical Technologies"**

### **Requirements**

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

**Assessment of compliance:** Fully compliant

The diploma sample provided in SAR (Annex "REGO diploms ENG") fully complies with the

procedure and regulations by which Latvian state-recognised documents of higher education are issued (Cab.Reg.No 202, <https://m.likumi.lv/doc.php?id=256157>).

The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202, however as it is a purely technical discrepancy, the experts do not think it should influence the overall evaluation of this criteria.

- 2 2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation

(SAR, Annex "Confirmation of the possibility for students to continue their education between the professional bachelor study programs "Adaptronics", "Computerised Control of Electrical Technologies" and "Smart Power Systems"", document No 01000-2.2.1-e/208).

- 3 3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation

(SAR, Annex "On compensation of losses in case the study program is not accredited, or the license of the study program is revoked, and a student does not wish to continue studies in another study program", document No 01000-2.2.1-e/178).

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the State Fee for Examining the Proficiency in the Official Language" (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex "On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/118).

- 5 5. 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.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Vice-Rector's for Academic Affairs confirmation (SAR, Annex "On the foreign language knowledge of the teaching staff involved in the implementation of

study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/117).

- 6 6. 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.

**Assessment of compliance:** Not relevant

- 7 7. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 "Mandatory Provisions to be Included in the Study Agreement" (SAR, Annex "Sample of Study Agreements").

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

All of these fully comply with the requirements set forth in Section 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education. The description of the "EEI502 Industrial Process Automation (study project)" discipline is missing from the information available to experts. In experts view, the absence of the description of this one study course would not influence the overall compliance to this criteria, as all of the other course descriptions were fully compliant.

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

**Assessment of compliance:** Fully compliant

According to the evidence provided as additional information by RTU (PS\_Vadosais\_elektroinzenieris\_7LKI\_REGO) the study programme fully complies with the valid professional standard in experts opinion.

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Partially compliant

Partially complies with the State Professional Higher Education Standard (Cabinet Regulations No 512). The following discrepancies were found:

- 1) The explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education is missing.
- 2) The amounts of the compulsory limited optional and free of choice part of the study programme and the distribution of credit points between them is not defined.
- 3) Opportunities for students who have not acquired the relevant knowledge in the previous study programme to acquire study courses that ensure the achievement of professional competences in business have not been defined.
- 4) Admission requirements with an indication of the English language test for students who will study the study programme in English are not defined.  
(SAR, Annex 6 "Atbilstība Valsts izglītības standartam REG00\_EN")

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

- 14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG\_jauns" and CV's of academic staff).

- 15 R5 - Overall rating

**Assessment of compliance:** Partially compliant

The study programme is partially compliant with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments. A few other technical improvements could be in place. See more in recommendations regarding this study programme.

## Requirements (R6-R8)

- 1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

**Assessment of compliance:** Fully compliant

This master study programme is fully compliant with the conditions for the implementation of

the study programme and ensuring the achievement of the learning outcomes since RTU is providing:

- a renewed library with a huge number of volumes and journals (also in electronic form) and an advanced information systems helping to find existing items;
- in the last years 12 laboratories have been totally upgraded and several advanced equipment was acquired which can be used both in teaching and research;
- the government is financing the teaching of each student enrolled in this study field yearly with more than 6000€ (6607.56€ in the last academic year). Supplementary, FEEE is also attracting other funds for financing the education in this study field.

- 2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

**Assessment of compliance:** Fully compliant

The teaching staff of this study programme is fully compliant with the obligatory requirements clearly set forth in regulatory documents. Upon their CV, it can be stated, that they have the compulsory qualification and experience in the topic of their courses. Cooperation both in education and research with Latvian and abroad universities led to an improvement in technical knowledge of the implicated teaching staff. A more intensive involvement of academic staff from other universities, highly qualified specialists from companies could improve the quantity and quality of the taught technical knowledge.

- 3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

**Assessment of compliance:** Fully compliant

The quality of teaching process, hence the knowledge level of graduated masters or doctors, very much depends on the program, provided bases of study process and teaching staff. According to experts evaluation results, all mentioned areas provided by RTU ensures possibilities for graduates to express themselves into the science area or to find a good job in industry in Latvia and elsewhere.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The "Computerised Control of Electrical Technologies" professional master study programme is fully compliant with almost all the key points and requirements prescribed in the Law on Institutions of Higher Education and other regulatory enactments included in the tables from chapter 5 of this assessment report. An exception is key point 12 (the study programme complies with the State Academic Education Standard or the Professional Higher Education Standard) which is only partially compliant.

The study programme formal indicators and their reflection in all the provided documentation perfectly correspond to the existing regulations. The name of the study program, the issued degree and gained professional skills, the study program aims and goals, outcomes to be achieved, and admission requirements are perfectly interrelated and mutually complementary.

The global impression upon the self-evaluation report and the organized meetings concerning this criterion of the expert team is positive. Some improvements must be performed for making the course syllabus more attractive and closed to the practical issues required by the companies hiring the graduates. Also, the share of practical works should be increased. More focus should be set on the feedback of the students and the results of the regular questionnaires. The study programme is

in line with the regulations and the good practices both in EU and Latvia. In general, the teaching process can guarantee the main aims of the programme and the achievement of the established learning outcomes. RTU offers a great diversity of student mobilities upon numerous cooperation agreements with foreign universities and companies. Unfortunately, only a small part of the students benefited of these excellent opportunities. The achieved learning outcomes during these foreign mobilities are recognised by RTU.

RTU offers the entire support for the high-quality education and research in this study field: financial, logistic, administrative. The involved teachers have at their hands everything needed for a high-quality teaching and research, as well the students for an effective learning.

The study programme has a relatively young teaching staff. The qualification of the teaching staff members is adequate and can assure the achievement of all the aims and learning outcomes of the study programme.

It appears that the university and faculty management undertake diverse acceptable methods to avoid any quality decrease in teaching process in the frame of this study programme.

The management staff should find the organizing way and financial resources to involve more teaching staff from top industry professionals from the given field, as well as foreign lecturers.

The involvement of most of the teaching staff in advanced scientific research is laudable. The number and variety of the research project they are involved is great. These projects are funded by international and national agencies and by industrial partners.

Better cooperation and collaboration mechanisms between the teaching staff is needed to effectively align the study content between different courses.

#### Strengths:

1. The way the greatest part of the self-assessment report was written;
2. All indicators and formal attributes are specified at professional level, corresponding to the current regulations. The interrelation between components of indicative evaluation is visible and undoubted;
3. All the recommendations from the former accreditation regarding the changes in the study plan were performed;
4. During the discussions a good relationship between staff, students, graduates and employers was noticed;
5. The great diversity of knowledge and professional skills offered to the master level students which enables them to have a good position in the local labour market or to continue their studies at doctoral level.
6. The intention of the management staff to permanently improve the curricula and the content of the courses of this study programme;
7. The special importance given to the obligatory internship to be performed for reinforcing theoretical knowledge and gaining more practical experience in the given field;
8. The establishing of the Golden Fund of graduates at RTU to reward the most outstanding graduates of RTU study programs;
9. The correct and well-established assessment method of the students' knowledge during their master study;
10. The inclusion of representatives of the industry in the State Examination Committee analysing the master theses;
11. The use of the ORTUS portal for the easy accessibility of students to the required student surveys and a facile and flexible data processing;
12. The well-elaborated study outcomes assessing system;
13. Cooperation with local companies in hosting students for internships;
14. The topics of the final master theses of the students cover a great variety of topics and also multidisciplinary subjects can be identified.

15. The budget used for educating yearly 1 M.Sc. student from this study programme is yearly increasing;
16. The successful efforts made to develop the teaching and research infrastructure connected to this study programme;
17. The various ways of support of both education and research related to this study programme.
18. The high and adequate qualification of the academic staff, which guarantees the fulfilment of the aims and outcomes of the study programme;
19. Momentary the academic teaching staff involved in this master study programme is a good mix of very experienced senior members and young people recently obtained the Ph.D degree.

Weaknesses:

1. There are disciplines covering a very narrow segment of their topic;
2. In several cases the recommended literature in the syllabus of the courses taught also in English comprises exclusively or partially Latvian resources, incomprehensible for foreign students;
3. During the organised meetings both the actual and graduated students emphasized the need to better fit the content of the courses to the real industrial needs. These observations were general, without naming the courses in case;
4. The self-assessment report focuses on the general benefits and requirements of the mandatory internships rather on presenting where these internships were performed (as it is provided in the case of the external mobilities) and the evaluation of the achieved knowledge during them.
5. The description of the "EEI502 Industrial Process Automation (study project)" discipline is missing from the information available to experts.
6. In the diploma supplement some technical discrepancies can be observed, such as the introductory paragraph in the Diploma Supplement provided in English is not fully aligned with the Cabinet Regulations No 202.
7. The study programme is not fully compliant with the State Professional Higher Education Standard.

Weaknesses:

8. The methods assumed by RTU and FEEE to avoid quality decreasing of the teaching process within the study programme are not sufficiently addressed in the self-assessment report;
9. Few lectures/presentations are organized by the involvement of top industry professionals and teachers from foreign universities.
10. Low number of students enrolled in this study programme.

**Evaluation of the study programme "Computerised Control of Electrical Technologies"**

Evaluation of the study programme:

Good

**6. Recommendations for the Study Programme "Computerised Control of Electrical Technologies"**

**Short-term recommendations**

Until the hearing of the Study Quality Committee, the study course "EEI502 Industrial Process Automation (study project)" description should be added to the other course descriptions.

Until the hearing of the Study Quality Committee, the explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education.

Until the hearing of the Study Quality Committee, the amounts of the compulsory, limited optional and free of choice part of the study programme and the distribution of credit points between them.
Until the hearing of the Study Quality Committee, the opportunities for students who have not acquired the relevant knowledge in the previous study programme to acquire study courses that ensure the achievement of professional competences in business.
Until the hearing of the Study Quality Committee, the admission requirements with an indication of the English language test for students who will study the study programme in English.
Until the hearing of the Study Quality Committee, the introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202.
In 2 years time shape the content of the courses by better integrating the new scientific achievements in the given field and the research results of the teachers.
In 2 years time include more practical work in the syllabus of the disciplines and use more up-to-date technologies (especially simulation software) during the practical teaching activities with the students.
Until the next admissions procedure starts for the students, adjust the recommended literature so that it would include also literature sources in English for foreign students.

### Long-term recommendations

Until the next accreditation more effective advertisement should be needed to attract more (preferably very good) students for this master study programme to stop the decrease of the involved students.
Until the next accreditation gradually integrate talented and devoted young specialists in the academic staff to increase the human resources sustainability. Help them to be more involved in research projects and thus make more attractive the academic career for them.
Until the next accreditation better stimulate academic staff members to publish their research results internationally in high-level journals.
Until the next accreditation procedure increase the count of lectures/presentations given by industry professionals and teachers from foreign universities.
Until the next accreditation, better fit the content of the courses to fit the real needs of the industry.

## II. "Smart Power Systems" ASSESSMENT

### II. "Smart Power Systems" ASSESSMENT

#### 1. Indicators Describing the Study Programme

##### Analysis

The university staff explained to experts that the goal of the programme is to support the energy branch in Latvia and abroad with appropriately educated scientists and engineers. The study programme is provided in Latvian and in English. The Baltic states power systems are facing

significant challenges during next 5 years and later on considering the planned synchronization with EU power network, which requires significant changes in the field of demand side management, system operation, as well as into the smart technologies, which should promote a proper system behavior and collaboration on all network levels – generation, grid, end-users and operation. In addition, the European member states are facing expected challenges to fulfill the EC Green deal program which requires the relevant knowledge, research and experts.

Considering the above mentioned, faculty has undertaken a commitment to provide knowledge in distributed generation, including renewable and demand side joint decentralized operation in the new environment. It must be estimated as a significant advantage of the programme because it has appropriate content, scope and effectively organized internship. In addition, the frame of study programme includes the important themes, which are necessary to provide a support for the smart electro energy road to and from generation and consumption including transmission, distribution and related services.

The faculty offers knowledge in communication skills in parallel with technical science, which is important in the environment of coming processes in research, implementation of the new techniques, as well as political and social discussions.

At the end of study graduates obtain the professional masters degree in power and electrical engineering. The Smart power systems study programme according to experts analysis is relevant to Latvian professional electro engineering standard “Elektroinženiera profesijas standarts”, which requires to provide relevant theoretical knowledge, practical skills in application of electrical equipment and devices and knowledge in the work organization, in social issues and economic activity principles.

Review of the teaching methods at the conditions of continuous increase of the information flow as well as incorporation of the development trends of the industry, considering the present situation in the power industry not only in Latvia but also worldwide can be considered to be a benefit.

The significant changes were made by the faculty by merging the academic master programme and the professional engineer programme for the academic year 2020/2021. University successfully implemented the requirements of the last development of the Latvia professional standard, which makes it possible to lift the restrictions for the graduates of the academic bachelor's programme to join the new study programme. The result is as follows: diminishing the fragmentation of study programmes and strengthening joint use of resources. According to the RTU Report, European experience was taken into account in the process of programme development. The experience was gained in the frame of international collaboration. The involvement of guest lecturers gave additional experience as well.

The determined admission requirements meet the aims and objectives of the study program and they are clearly expressed and interrelated. There are six compulsory study courses, twenty compulsory elective study courses and internship.

The name of the study programme expresses the comprehensive essence of studies. However, the idea of subtitle “controlled power on electro energy road to and from generator and end-user” could be incorporated, to underline the sense of smartness of the modern power system.

At present there are set following programme admission requirements – Professional bachelor's degree in Electrical Science and qualification of Electric Engineer, or second-level professional higher education and qualification of Electric Engineer Academic bachelor's degree in Engineering. Experts recognize that the master's programme in some extent is unique in Latvia and requires appropriate background knowledge, but at the same time it must be mentioned that the new smart approach to power system issues requires knowledge in IT and physics. Due to those considerations, the possibility of accepting an IT and physics bachelor's degree would increase the number of potential students.

## **Conclusions by specifying the strengths and weaknesses**

#### Conclusions:

Study programme Smart Power Systems is interrelated with the professional qualification to be acquired - Leading Electrical Engineer. Considering the present situation and expected future developments in the power industry in Latvia, Baltic states and Europe, the suggested programme can be evaluated to be beneficial for the energy branch.

#### Strengths:

1. Faculty is providing the education into the frame of overall knowledge in the smart electro energy road to and from generation and consumption including transmission, distribution and related services.
2. Faculty by merging two previous study programmes has diminished the fragmentation of study programmes and has strengthened joint use of resources.

#### Weaknesses:

1. Admission requirements limit the possibility for IT and physics' bachelor graduates to study in the programme. That reduces the number of study programme students with a suitable background knowledge.

## **2. The Content of Studies and Implementation Thereof**

### **Analysis**

1. It can be concluded that the professional master study program "Smart Power Systems" ensures full-fledged correspondence of the education content to the requirements set in the profession standard and corresponds to the requirements suggested and set by the Latvia leading enterprises in the field. Faculty successfully implemented the requirements of the last development of Latvia's professional standard, which makes it possible to lift the restrictions for the graduates of the academic bachelor programme to join the study programme. More effective utilization of graduates in the power branch will be the result. In the process of development of the programme experts of the local industry were involved in different ways, for example, as members of the Council of the Faculty (Ref: RTU information letter)

The defined goals of the programme are relevant to actual requirements of industry (Ref-LEEA letter: in Latvian - Par elektroenerģētikas nozares darba devēju, nozares organizāciju un augstākās izglītības iestāžu sadarbību studiju satura un pētījumu novērtēšanā un pilnveidošanā). It definitely helps graduates to start work in the power enterprises business. There is established good relationship between faculty and Latvia's leading electricity industry companies: JSC "Augstsprieguma Tīkls" (High Voltage Network), JSC "Latvenergo", JSC "Sadales Tīkls" (Distribution Network), JSC "Rīgas siltums" (Riga heating utility) as well as with Ministry of Economics, the Latvian Association of Power Engineers and Energy Constructors (LEEA) and Europe Join Research Center (EJRC) where number of RTU students are working Ref: RTU information letter).

It can be mentioned that study content provides background knowledge to meet the scientific trends, for example, into the work realizing value from electricity markets with local smart electric thermal storage technology.

2. One of the basic principles in the study programme of the Faculty of Electrical and Environmental Engineering is democracy and dialogue with students - student-centered teaching and learning. Actively involving them into the improvement of the study process is established. At the students and experts meeting, it was underlined that an individual approach is available and effective if necessary for students. The lectures have been provided in Latvian and English, which gives an opportunity to increase the total number of students, however this year there are no foreign students in this programme. In addition, the foreigners' better English knowledge is desirable. The

analyses are based on past experience, which must be taken into account in the future. The study programme in the form of lectures, practical classes, laboratory work and internship provides in-depth knowledge in electric power engineering and electrical engineering and ensures skills in the fundamentals of scientific research work, in doing so they prepare high-level specialists. There are a number of compulsory study courses and elective study courses (Ref:Information available on the RTU webpage: <https://stud.rtu.lv/rtu/discpub/list?page=3> ). The study process is concluded by an internship and a national examination, which includes writing and defending a master's thesis which must comply with the provisions set forth in the regulatory enactments. As a result, the students use the above knowledge and findings during their internship as well as after graduating at Latvian and foreign enterprises. The internship is mutually beneficial for the new specialists and enterprises.

To make administrative work more efficient, there are also electronic document management systems. Electronic signing of student agreements is ensured in the admissions procedure. Electronic approval of documents and electronic signature functionality have been introduced, thus diminishing the turnover of printed documents and considerably improving the speed of document turnover. For quality assurance, there is a digital system for student surveys, which ensures quality monitoring regarding the implementation of study courses and study programmes, which takes place every term. During the meeting with students, the experts got very positive evaluations. According to the RTU strategy plan 2021-2025, the video materials will be widely used in streaming lectures in the study process. According to the same plan, information about additional opportunities and various activities (e.g., free software, excursions, opportunities for internship, scholarships, summer work, etc.) will be published on the website of the Department.

The students and the teaching staff also have access to other RTU infrastructure elements: canteens and cafes (which are to be found at each building complex), photocopying units, student hotels, sports and recreation centers, a swimming pool, etc.

3. The new - merged programme confirmation process is appreciated. The process provided discussions and confirmation at the commission of the study direction "Power Industry, Electric Engineering and Electric Technologies" and following confirmation at the Council of the Faculty. Participation of students in the Council of the Faculty is a very efficient approach. The cooperation between the faculty and local entrepreneurs (the main power branch players) is established in different forms - internship, thesis themes. However, during the meetings with students the experts got information that new additional ways must be found to help students, for example, analyses of actual important case studies in industry.

An important role in ensuring the link between students, instructors and the programme administration belongs to the student self-government of the faculty, which actively participates in all of the study processes and conducts annual assessment of the teaching staff (in Latvian - Elektrotehnikas un vides inženierzinātņu fakultātes studentu pašpārvaldes darbības programma.).

4. There is no data about mobility activities amongst Smart Power Systems Professional master study program students at the first program implementation academic year 2021/2022. Both the incoming and outgoing mobility is quite limited due to the overall situation. Thus, the opportunities of incoming mobility still are scarce. Experts recognize that RTU is still doing the best to promote mobility, but it mostly depends on the overall process. In addition, the level of knowledge and thus, the quality of the foreign students is considerably influenced by various personal factors - knowledge background, financial factors etc., which have to be taken into account when working with each student.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The study programme has been formed and implemented in close cooperation with scientific institutions and with those representatives of the industry who are members of the Latvian Association of Power Engineers and Energy Constructors (LEEAA) and other associations. The education process must be evaluated excellently, the graduates are on a good professional level and meet to present expectations of the entrepreneurs.

Strengths:

1. RTU successfully managed requirements of the last development of Latvia's profession standard.
2. In the process of development of the programme experts of the local industry were involved.
3. The programme provides interlinkage with results, as result recognized graduates' position in the labor market and positive feedback from entrepreneurs.
4. The lectures have been provided in Latvian and English, which gives an opportunity to increase the number of foreign students.

Weaknesses:

1. Only five students from 2014 spent one or two terms of study within the Erasmus+ program.
2. Based on the replies of the students and the employers it can be pointed out that more cooperation and discussion must be initiated from both entrepreneurs and university.

### **3. Resources and Provision of the Study Programme**

#### **Analysis**

There are several departments responsible for purchase of materials, technical, methodological and informative provision, for example: the Student accommodation department, the Infrastructure department, the Student service department, the Infrastructure department. The IT department provides 53 different IT services.

RTU buildings are equipped with state-of-the-art technical support and control systems and equipment. Modern, reliable, secure and unified IT infrastructure provides up-to-date quality IT services. All IT users are provided access to the centralized system, which functions as a single digital gateway, combining information from all RTU information system components. The several IT systems are used for different purposes: Centralized Study Management System - for efficient administration of the study process; Moodle e-learning system - where the academic staff members place various electronic materials, assessment tests, homework assignments, information on a particular study course; the ORTUS internal system of the university, which provides all necessary information to all students: Centralized Research Support System - records all information on publications, patents, commercialization applications, Doctoral Theses, RTU scientific journals, etc. Since 2007, more than 130,000 unique study course sites have been generated in the e-learning environment of RTU. Students can access electronic learning resources anytime and anywhere. In addition the widely supplied library can be utilized. RTU has fast optical internet and a broad infrastructure of wireless network with more than 400 access points.

More than 15 upgraded and new laboratories have been established with all-new infrastructure and equipment for research of industrial processes - furniture, voltage switchboards, workbenches etc., for example: Laboratory of Electric Power Supply Systems, Laboratory of the Electric Part of Power Plants and Substations. The main Latvia power branch enterprises are pretty much interested to cooperate with RTU to solve their tasks. Qualification of the research staff and the students' knowledge in the frame of the relevant laboratories provide fast and valuable practical solutions for the industry. In addition, the Creative Student Lab has been founded. So during the last decade RTU became the largest university in the Baltic states and after the last renovations the Ķīpsala Campus in Riga will become the most modern engineering study center in the Baltic States. ([https://files.rtu.lv/public/ortus/Strategija\\_RTU.pdf](https://files.rtu.lv/public/ortus/Strategija_RTU.pdf)) The important role in ensuring students

methodologically and informationally is played by the rich and modern university library which is accessible 7/24 h. The library ensures students, academic staff and other interested persons individual consultations and group training on the subject of information literacy. I.e. a total of 137 complaints/proposals were received from students in 2020, but just one about library activity. Library plays an important role in the provision of methodological guides and educational resources to students. RTU Scientific Library (<https://www.rtu.lv/en/studies/scientific-library>) is a library of national importance, which has acquired its status in the process of library accreditation. The funding is set and managed according to three different sources and ways: the state law and budget, RTU internal methodologies and responsible administrators and external sources of financing and their requirements.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The RTU administrative structure ensures excellent provision of university operation, staff management, study process and overall internal life. RTU effectively reacts to the actual needs of Latvia industry and implements modern training methods. It is the largest university in the Baltic states and after the last renovations the Ķīpsala Campus in Riga will become the most modern engineering study center in the Baltic States.

Strengths:

1. RTU provides the up-to-date available methods for students' study process.

Weaknesses:

None identified.

## **4. Teaching Staff**

### **Analysis**

1. The RTU efficiently implements different methods to improve the staff skills. There are several units, which are responsible for that: Centre for Academic Excellence, Career Support and Services Unit, IT User Support Centre. The methods are developed based on surveys from teaching staff, industry experts and students. State-of-art study methodologies and rapidly ongoing changes in the industry pushed forward involvement of youngest academic staff (82% are under fifty years of age). The qualifications of the teaching staff are constantly improved, this process was promoted when the study field "Power Industry, Electrical Engineering and Electric Technologies" became involved in the European Social Fund project "Strengthening the Academic Staff of Riga Technical University". University provides the well-developed e-resources (the ORTUS portal) and library which is also a good platform for staff education and information provision. The deans now have greater opportunities to ensure the development of faculties, which is their responsibility and since the academic year 2019/2020, deans of the faculties have additional funding from the tuition fees of foreign students. As a result, the activities of the persons responsible for the implementation of the study programmes were facilitated. To some extent the above changes could support financing capability for teaching and research staff. Administration jointly with staff developed RTU Strategy document for 2021-2025 creates the confidence that administration and staff desire to develop the quality of the staff according to actual situation in industry and science as well as modern requirements.

2. The primary criterions, used by administration to select the teaching staff is knowledge about the

recent achievements and participation in scientific and research projects in their field, state-of-the-art teaching skills in the relevant field, as well as experience working with foreign students. There is a significant share (57% below 40-year age) of young academic staff. The academic staff, which ensures the theoretical and research potential, 96% consists of the personnel with PhD degree in Engineering. Although it seems that there are no problems with English language knowledge of teaching staff at present (16 of 28 are well skilled), administration takes care to improve the language skills. Half of the teaching staff is composed of teachers related to the relevant industry, almost 20% are actively involved in the industry, but 28% have at least undergoing practical training at an enterprise. Must be recognized, that RTU teaching and research staff have lower salaries compared to the industry. This could result in difficulties to complete staff. Additional services could be suggested for entrepreneurs with their financing, as well as discussion about salaries on a political level.

3. N/A

4. The teaching staff regularly provides scientific publications as well as popular science publications and participates in international conferences and local public-awareness-raising events. Daily staff duties duplicate and all elected members of the academic staff have both academic and research workload. RTU does not put a strict line between academic and research workloads, their proportion is defined individually for each member. There are eleven different project financing frameworks available at present. Addition to international projects, RTU was involved in local activities, for example, within the framework of Latvian state research program “Energy” run by academic personnel of the study field “Power Industry, Electrical Engineering, and Electrical Technologies” since 2014, for example some of the projects, where the Institute of Energy Systems and Environment is involved - Establishment of Nordic-Baltic PhD and researcher mobility network in the field of the bioenergy - ReMoNet-Bioenergy - 2020 - 2024, Development and research of spread-spectrum-based control methods for magnetic resonance wireless power transfer systems - 2020 - 2023 and High power density inductive wireless power transfer systems based on novel multi-coil solutions for dynamic battery charging - 01.12.2020 - 31.12.2021. In addition, the teaching methods were developed.

5. There are different communication possibilities provided to obtain the necessary information and skill. These are IT platforms, library as well as organized seminars, international conferences and courses. There is a mechanism for mutual collaboration between the teaching staff members in place, which contributes to the improvement of the study courses/ modules and their correlation. According to the tasks of the study programme, the primary criteria by which teaching staff is selected are as follows: knowledge about the recent achievements and participation in scientific and research projects in their field; state-of-the-art teaching skills in the relevant field; experience working with foreign students. An important role in ensuring the link between students, instructors and the programme administration belongs to the student self-government of the faculty, which actively participates in all of the study processes and conducts annual assessment of the teaching staff.

### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The results overall can be estimated as excellent taking into account that university at all time takes care of improvement and development of teaching staff skills that is based on relevant decisions methodologies. The analysis of RTU documents and answers received from personnel provided a comprehensive picture of the above mentioned approach. The 16 of 28 teaching staff can serve

lectures in Latvian and in English, which raises the visibility and prestige of RTU.

Strengths:

1. There is a large proportion of young academic staff (82% are under fifty years of age).
2. Academic staff has high qualification which ensures theoretical and research potential - 96% have the degree of Doctor of Engineering or a different doctoral degree (PhD).
3. University provides the well-developed e-resources (the ORTUS portal) and library which is also a good platform for staff education and information provision.
4. The study process involves guest lecturers - specialists from the industry and enterprises who, within corresponding study courses, provide specific knowledge and share their experience.
5. There are several structures in RTU, which take care of teaching staff qualification levels in different ways.
6. Academic staff are being trained in the framework of the project.
7. Periodic evaluation of scientific and pedagogical qualifications is performed and pointed in the RTU Strategy document for 2021-2025, in which elaboration all staff took part.

Weaknesses:

None identified.

## 5. Assessment of the Compliance of the Study Programme "Smart Power Systems"

### Requirements

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

**Assessment of compliance:** Fully compliant

The diploma sample provided in SAR (Annex "Pielikums\_14\_Diploms") fully complies with the procedure and regulations by which Latvian state-recognised documents of higher education are issued (Cab.Reg.No 202, <https://m.likumi.lv/doc.php?id=256157>).

The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202, however as it is a purely technical discrepancy with a few words being different, in experts opinion it does not affect the overall assessment of this criteria.

2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "Confirmation of the possibility for students to continue their education between the professional bachelor study programs "Adaptronics", "Computerised Control of Electrical Technologies" and "Smart Power Systems"", document No 01000-2.2.1-e/208).

3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "Confirmation of the possibility for students to continue their education between the professional bachelor study programs "Adaptronics", "Computerised Control of Electrical Technologies" and "Smart Power Systems"", document No 01000-2.2.1-e/208).

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the State Fee for Examining the Proficiency in the Official Language" (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex "On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/118).

5. 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.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Vice-Rector's for Academic Affairs confirmation (SAR, Annex "On the foreign language knowledge of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/117).

6. 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.

**Assessment of compliance:** Not relevant

7. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 "Mandatory Provisions to be Included in the Study Agreement" (SAR, Annex "Sample of Study Agreements").

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Study course descriptions are fully in compliance with the Law on Institutions of Higher Education Section 561, Paragraph two. (SAR, Annex "Pielikums\_14\_Apraksti")

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

**Assessment of compliance:** Fully compliant

According to the evidence provided as additional information by RTU (PS\_Vadosais\_elektroinzenieris\_7LKI\_EGR0) the study programme fully complies with the valid professional standard in experts opinion.

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Not relevant

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

**Assessment of compliance:** Partially compliant

In general it compliant with the State Professional Higher Education Standard (Cabinet Regulations No 512). The size and amount of Latvian credit points for the freely elective part is not separated and defined in the description.

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

- 14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG jauns" and CV's of academic staff).

## 15 R5 - Overall rating

### **Assessment of compliance:** Fully compliant

The study programme is fully compliant with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments. A few technical improvements could be in place. See more in recommendations regarding this study programme.

## **Requirements (R6-R8)**

- 1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

### **Assessment of compliance:** Fully compliant

At the moment the study process has been provided in accordance with the state-of-art way requirements, which reflects and supports the development trends in Latvia industry branch and European green policy. The developed RTU campus with excellent study, research and living conditions can be highly appreciated. This is a significant base for RTU to become the leading university in the region.

- 2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

### **Assessment of compliance:** Fully compliant

The qualification of the teaching staff can be estimated relevant to the study program. Partly involvement of experts from industry ensures appropriate tie between knowledge and practice. Although, the link of students' internship and industry as well as support for students working in parallel must be supported more.

- 3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

### **Assessment of compliance:** Fully compliant

The quality of teaching process, hence the knowledge level of graduated masters or doctors, very much depends on the program, provided bases of study process and teaching staff. According to experts evaluation results, all mentioned areas provided by RTU ensures possibilities for graduates to express themselves into the science area or to find a good job in industry in Latvia and elsewhere.

## **Conclusions by specifying the strengths and weaknesses**

### Conclusions:

In overall the programme, teaching staff and study process provides excellent knowledge, which ensures graduates with chance to express themselves into the science area or to find a good job in industry in Latvia and elsewhere. Study programme Smart Power Systems is interrelated with the professional qualification to be acquired - Leading Electrical Engineer. The study program has been formed and implemented in close cooperation with scientific institutions and with those representatives of the industry. The education process must be evaluated excellently, the graduates are on a good professional level and meet to present expectations of the entrepreneurs.

The RTU administrative structure ensures the excellent provision of university operation, staff management, study process, and overall internal life. RTU effectively reacts to the actual needs of the Latvia industry and implements modern training methods. The experts took into account that the university at all times takes care of improvement and development of teaching staff skills that are based on relevant decisions methodologies. The analysis of RTU documents and answers received from personnel provided a comprehensive picture of the above-mentioned approach. Considering the present situation and expected future developments in the power industry in Latvia, Baltic states and Europe, the suggested programme can be evaluated to be beneficial for the energy branch.

#### Strengths:

1. Faculty is providing the education into the frame of overall knowledge in the smart electro energy road to and from generation and consumption including transmission, distribution and related services.
2. Faculty by merging two previous study programmes has diminished the fragmentation of study programmes and has strengthened joint use of resources.
3. The university has undertaken a commitment to provide knowledge in distributed generation, including renewable and demand side in joint decentralized operation in the new environment.
4. The university strives for effective organization of students' practical activities and internship.
5. The programme includes the important themes, which are necessary to provide a support for the smart electro energy road to and from generation and consumption including transmission, distribution and related services.
6. University provides the well-developed e-resources (the ORTUS portal) and library which is also a good platform for staff education and information provision.
7. There are several structures in RTU, which take care of teaching staff qualification levels in different ways.
8. RTU successfully managed requirements of the last development of Latvia's profession standard.
9. In the process of development of the program experts of the local industry were involved.
10. The program provides interlinkage with results, as result recognized graduates' position in the labor market and positive feedback from entrepreneurs.
11. The lectures have been provided in Latvian and English, which gives an opportunity to increase the number of foreign students.
12. Faculty building and new infrastructure represent the strength of the study program.
13. Faculty building and new infrastructure represent the strength of the study program.
14. RTU provides the up-to-date available methods for students' study process.
15. There is a large proportion of young academic staff (82% are under fifty years of age).
16. Academic staff has high qualifications which ensures theoretical and research potential - 96% have the degree of Doctor of Engineering or a different doctoral degree (PhD).
17. The study process involves guest lecturers - specialists from the industry and enterprises who, within corresponding study courses, provide specific knowledge and share their experience.
18. Academic staff are being trained in the framework of the project.
19. Periodic evaluation of scientific and pedagogical qualifications is performed and pointed in the RTU Strategy document for 2021-2025, in which elaboration all staff took part.

#### Weaknesses:

1. The introductory paragraph in the Diploma Supplement provided in English is not fully aligned with the Cabinet Regulations No 202.
2. The description of freely elective part in the study programme is not defined.

#### Weaknesses:

3. Admission requirements limit the possibility for IT and physics' bachelor graduates to study in the

programme. That reduces the number of study programme students with a suitable background knowledge.

4. Only five students from 2014 spent one or two terms of study within the Erasmus+ program.

5. Based on the replies of the students and the employers it can be pointed out that more cooperation and discussion must be initiated from both entrepreneurs and university.

### **Evaluation of the study programme "Smart Power Systems"**

Evaluation of the study programme:

Good

### **6. Recommendations for the Study Programme "Smart Power Systems"**

#### **Short-term recommendations**

Until the hearing of the Study Quality Committee, the introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202.

Until the hearing of the Study Quality Committee, the description of the freely elective part of the study programme should be added.

In 2 years time the University must investigate reasons why there is low interest to participate in the Erasmus+ program. To initiate more mobility of RTU students each case must be evaluated.

Students mentioned that the support provided by the university regarding the sport activities is very useful. However, the financial support is too short, just some first months, hence in 2 years time it would be beneficial to increase it.

Based on the replies of the students and the employers it can be pointed out that more cooperation and discussion must be initiated from both entrepreneurs and university. Two ways could be suggested to be implemented in 2 years time: additional meeting framework or more industry representatives involved in existing frameworks.

In 2 years the University should support physical activity in different ways, financing as well.

#### **Long-term recommendations**

Due to existing program prerequisites, there is limited possibility for a number of excellent IT and physics' bachelor's course graduates to join the Smart Power Systems Professional master study course. This results in a reduced number of masters' course students with an important background knowledge. Experts suggest until the next accreditation to make the programme accessible for IT and physics' bachelor's course graduates.

Must be recognized, that RTU teaching and research staff have lower salaries compared to industry. This could result in difficulties to complete staff. Until the next accreditation, additional service could be suggested for entrepreneurs with their financing and discussion on political level.

There are different ways how the quality of foreign students could be improved. One way could be more information on the international level and higher tuition, which might be implemented until the next accreditation.

## II. "Computerised Control of Electrical Technologies" ASSESSMENT

### II. "Computerised Control of Electrical Technologies" ASSESSMENT

#### 1. Indicators Describing the Study Programme

##### Analysis

1. Regarding current formal requirements, the study programme corresponds to them, justified by Annex 6 Compliance of the study programme with the State Education Standard . The provided degree, name, diploma and other requirements are met (Annex Diploma supplement ) . The study programme is intended to be implemented in the form of full-time studies in Latvian and English, the duration of the study programme is 4 years and its volume is 192 CP. The degree obtained until 2020 was the Doctor of Engineering Sciences, but according to changes to the Cabinet regulations, as of 2020 the degree to obtain is Doctor of Sciences (PhD). The aim of Doctoral studies is to train high-qualified specialists in the area of computerized control of electrical technologies objects, who can solve tasks of scientific novelty, and to prepare lecturers for Higher educational establishments and researchers for scientific institutions, it is justified by Annex 9 Curriculum of the study programme (for each type and form of the implementation) of the study programme and Annex Descriptions of the study courses/ modules.

The name of the study programme - "Computerised Control of Electrical Technologies]" and the degree are correlated with objectives, learning outcomes, and admission requirements. Specialists with a master degree in engineering sciences can be enrolled in the PhD study programme. The admission of candidates takes place on the basis of a ranking.

#### Conclusions by specifying the strengths and weaknesses

Conclusions:

The study programme formal indicators and their reflection in provided documentation correspond to the existing regulations. The name of the study program, the issued degree, the study programme aims and goals, outcomes to be achieved, and admission requirements overall are interrelated and mutually complementary. This is justified for example, by information from 8 annex (learning outcomes of study programme), from 14 annex (diploma supplement). The development of the doctoral programme according to the received document (Summary of doctoral study program development plan) also is aimed to strengthen the above-mentioned interrelation. It is professionally tailored and understandable.

Strengths:

1. Due to the internal quality assessment system, the documentation is in good shape and quality. All indicators and formal attributes are specified at a high level, corresponding to the current regulations. The interrelation between components of indicative evaluation is visible and undoubted.

Weaknesses:

None.

#### 2. The Content of Studies and Implementation Thereof

##### Analysis

As the primary information source, the expert group used a self-assessment report, which provides subject syllabus, curricula, lecture schedules, study courses descriptions and general programme description in terms of goals, outcomes and development plans.

1. The descriptions of the study courses/ modules, the traineeship, and the final thesis are generally of high quality and comply with the provisions set forth in the regulatory enactments. The content is overall relevant and complementary, and it complies with the aims of the study programme, ensures the achievement of the learning outcomes, and meets the needs of the relevant industry and the scientific trends overall, but in detail there would be more topics concerned with distributed computer control systems, especially in sphere of electrical power supply systems. The outcomes in English for example are not guaranteed by the limited quantity of courses according to information from 8 and 9 annexes. The Recommended literature in study courses descriptions partly needs to be updated for example EEP602 "Dynamics and Energetics of Electrical Drives" has literature with years of issue: 1998, 2000, 2001.

2. The study implementation methods during PhD studies, for example, individual cooperation with the scientific adviser-professor are provided to the PhD students for mastering; procedures are elaborated for defense of dissertation in the Doctoral Council P-14 and obtaining PhD degree. The study process contains lectures and practical training and R&D activities. The procedure of evaluation of students' knowledge, skills and competences is defined by the Senate of RTU decision of 27 May 2017 "Regulation on the Assessment of Learning Outcomes", the cumulative assessment system is applied in assessing students' achievement where the final grade consists of several components. The above mentioned process is capable of contributing to the achievement of the aims and learning outcomes of the study courses and the study programme. Student-centered learning and pedagogical principles are taken into account in scope of study process implementation.

3. The outcomes of the surveys conducted among the students, employers, and graduates are used to improve the quality of studies. Every year, PhD students have to report on their progress. Assessment of student learning outcomes is carried out in accordance with the "Regulation on the Assessment of Learning Outcomes" (approved at the Meeting of RTU Senate on 27 May 2017, Minutes No 610). The surveys among graduates are conducted constantly, we can see the results in documents in HEI other annexes, 15. Annex. There is no documented information about surveys among employers of programme, but during discussions with employers experts got the impression about feedback existence. The survey results are available at the ORTUS portal. But there is not enough information for foreign students in English on the ORTUS platform about surveys aimed to improve the quality of the study process.

4. Incoming and outgoing mobility opportunities are available for students and the learning outcomes achieved during such mobility are recognized. Cooperation has been launched with several foreign universities, the full list is attached at the study field self assessment report, where, through the ERASMUS+ exchange programme, students successfully start training and successfully develop PhD Theses. There are few examples of such cooperation in the programme self assessment report - 2 students in 2016 and 2020 at Tallinn University of Technology and Free University of Brussels, 12 annex of study field self assessment mistakenly contains 2 mentions of student Mārcis Priedītis. Recognition of study courses covered during mobility takes place according to the 2 elaborated documents mentioned in self assessment report of programme (Recognition of study courses covered during mobility takes place according to the "Amendments to the Organisation Procedure of Erasmus+ Student Mobility" (Resolution of RTU Vice-Rector for Academic Affairs No. 01000-1.1/240 as of 29 October 2014) and "Regulation on the Recognition of the Courses Completed at Other Universities and RTU Study Programmes" (Resolution of RTU Vice-Rector for Academic Affairs No 02000-1.1/29 as of 4 April 2016) unfortunately, there are no links to these documents.

## **Conclusions by specifying the strengths and weaknesses**

#### Conclusions:

Overall impression is positive but some additional work must be done to close insufficient gaps, for example, update recommended literature in study courses descriptions, increase English courses quantity. Experts conclude that the programme complies with the existing regulations and good practices in EU and Latvia. The current quality assurance systems provide a significant positive influence on the overall consistency of documentation and internal procedures. The study process guarantees achievement of proclaimed objectives and especially learning outcomes for students. Analysis of the references system of students, graduates and employers regarding the study process allows us to view the situation within the context and gives an impression about resultative implementation of improvements in both organization of studies and the teaching approach in the programme. Evaluation of mobility opportunities based on offered documentation and discussions with students allows us to make the conclusion - a wide range of opportunities really exist and are demanded and used. We can make the assumption that outcomes received during mobility activities are recognized on a fair basis.

#### Strengths:

1. Methodical complex of programme corresponds to high standards. The content is relevant, ensures the achievement of the learning outcomes, and meets the needs of the relevant industry and the scientific trends.
2. There is a strong sense about relevancy with industry and modern scientific trends.
3. Individual cooperation with scientific adviser-professor.
4. There is an elaborated and professionally used reference system which ensures the improvement of the quality of study system. There are different ways for implementation of the system, for example, through the ORTUS platform.
5. There is an extensive list of international universities, cooperation with them leads to a higher level of students' knowledge, skills and competences as result of participation at study courses implemented by other internationally recognized higher education institutions.
6. The elaborated system for mobility providing is working, the results are evaluated and outcomes achieved during such mobility are recognized.

#### Weaknesses:

1. Insufficient study courses for students to be able to apply knowledge of foreign language at the level of international scientific discourse.
2. Recommended literature in study courses descriptions is outdated. For example - EEP602 "Dynamics and Energetics of Electrical Drives" has years of issue: 1998, 2000, 2001.
3. Distributed computer control systems (DCCS) should be described in study courses in more detail.
4. There is not enough information for foreign students in English on the ORTUS platform about surveys aimed to improve the quality of the study process.

### **3. Resources and Provision of the Study Programme**

#### **Analysis**

The expert group performed its analysis on the basis of a self assessment report, visit on premises of faculty and discussions with staff and students of the programme. The overall impression of study provision is excellent.

1. The study provision, scientific support, informative provision, material and technical provision, and financial provision comply with the specific features and the conditions for the implementation of the study programme and guarantee development. For example, RTU has developed the Centralized Research Support System, which records all information on publications, patents,

commercialization applications, Doctoral Theses, RTU scientific journals, research staff, etc. The system provides access to information according to Open Access principle (<https://science.rtu.lv>). Programme students and academic staff have centralized access to research software and system resources. Table 3. Funding of the PhD study programme “Computerised Control of Electrical Technologies” from self assessment justify that annual costs per 1 student, EUR are 13215,13. With ERDF funding to the field of Power Industry, Electrical Engineering and Electrical Technologies, since 2014 the study process has been implemented in a new and modern building. In parallel, existing and new laboratories have been upgraded. Among them are laboratories for the programme such as Computer Management Training and Research Laboratory, Student Creative Laboratory and others. Extensive list of laboratories (14 annex) testify about the compliance of resources. But there is no evidence from documents and information gathered during the visit about the ability of existing robotics systems to be used for computerized control of electrical systems. The Scientific Library of RTU (<https://www.rtu.lv/en/studies/scientific-library>) is an academic library of state significance, which has obtained its status as a result of library accreditation. The library sources are housed in an open-access collection accessible for students and teaching staff.

2. Resources provided within the cooperation with other scientific institutions and institutions of higher education, comply with the requirements for the implementation of the doctoral study programme and are sufficient. For example, successful cooperation has been developed with the staff of the relevant faculty of Tallinn University of Technology, which ensures the improvement of the professional skills of employees and the exchange of students and employees. The high level of R&D activities and study process quality serve as a basis for equal cooperation. For example, cooperation of the Institute of Industrial Electronics and Electrical Engineering with other scientific institutions and higher education institutions ensures the involvement of PhD students in scientific work. For example, IEEE has cooperation agreement with EON-RWTH Aachen Research centre, the University of Duisburg-Essen and Mechanics Institute laboratory, as well as cooperation agreement with CERN signed in 2012, as a result of this cooperation V. Veckalns defended his PhD Thesis.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

1. Evaluation of programme's study resources and provision in different forms (scientific, informative, material and technical, financial) allows to make statement, that existing complex of resources and activities is professionally balanced, has excellent planning and management and aimed to provide an opportunity to increase the competitiveness, quality and efficiency of the study and R&D process at faculty and programme level.
2. The current situation of cooperation activity in implementation of PhD programme in a self assessment report is shown in compact form. Cooperation of the Institute of Industrial Electronics and Electrical Engineering with other scientific institutions and HEI ensures the involvement of PhD students in scientific work within the framework of this cooperation, on the Institute's study and scientific resource base.

Strengths:

1. Sufficiency of resources for sustainable development of programme study process and R&D activities. Long list of partners in the sphere of international cooperation, real use of offered possibilities.
2. The high level of R&D activities.

Weaknesses:

1. Low level of research of existing robotics systems in faculty laboratories for use in computerized

control of electrical systems.

## 4. Teaching Staff

### Analysis

The analysis is based on several information sources, including a self-assessment report, scientific publications summary, CVs and subject syllabuses. A separate discussion was used during the visit to clarify some particular aspects of scientific activities and collaborative activities in the faculty.

1. RTU and faculty undertake necessary measures in a target-oriented manner to avoid negative effects on the quality of the implementation of the study programme. Compliance of the study programme with the requirements set forth in the regulatory enactments is grounded. The academic staff conforms to the requirements of implementation of the study subjects. This is confirmed by both the description indices and CV's, the scientific and methodological developments by the teaching staff, and their participation in international scientific and methodological conferences. For example, from self assessment, changes in the composition of the teaching staff 2013 - 2020 for different positions are: Professor - from 7 to 8, Acting Professor - 1 to 2, overall statistics are positive except Assistant professor (practical). The overall stability of academic staff during 2013-2020, its education, experience, and activity in R&D guarantee the sustainable development of the programme in future.

2. The qualification of the teaching staff members formally complies with the requirements for the implementation of the study programme and the requirements set forth in the regulatory enactments is justified in Confirmation AL55 and Confirmation from Latvia Scientific Council, and also in CV of academic staff. Changes in the composition of the teaching staff overall are logically incorporated into the study process. 8 Professors and 4 Associate Professors participate in the implementation of the study programme. For example, Professor Leonid Ribickis holds a Doctoral degree in engineering. Alongside his academic, scientific and organizational activities, he is actively involved in Latvia's and global scientific organizations, contributing to the development and improvement of the power and electrical engineering sector.

3. The number of research publications by the members of academic staff involved in the implementation of the study programme with citation in Web of Science/Scopus is impressive, for example L. Ribickis in 2020 had 10 such publications as mentioned in a self assessment report annex Direction publications in the period from 2014 to 2020. From the other point of view only 10-15% of publications strongly correlate with programme topics.

4. There is an extensive list of research-related projects (more than 140) with involvement of academic staff of study field (13 annex). Information about participation of academic staff of programme is not provided separately, but experts have validated this information during discussions with academic staff. For example, project Industrial Internet methods for electrical energy conversion systems monitoring and diagnostics, management Prof. O.Krievs. For example, the results of the European international projects LITES, ERDF uMOL and ERDF SAVAS are used as lecture material, laboratory work and practical calculation tasks in the study courses "Energy Efficient Lighting", "Introduction to Specialisation". In addition, the AREUS Project Laboratory is used for this study course in addition to practical work in the course "Control and Regulation of Electrical Drives". Since 2016, Dr.sc.ing, Production Planning Engineer Dāvis Meike from Mercedes-Benz delivers the study course "Fundamentals of Industrial Robotics". But such extensive activity in R&D may lead to disbalance with study process quality.

5. As mentioned in Efficiency of the Internal Quality Assurance System analysis of this Document, RTU has developed a procedure for the development, approval and supervision of the study programmes - "Approval of the new version of the Procedure of Application, Development and Amendment of Study Programmes" (SAR, List of the main normative acts and regulations, Annex 6).

All of the procedures defined there are clear and logical. Each faculty has its own advisory board from the industry. The experts from self assessment may conclude that the annual review of the courses of the study programme takes place, as well as seminars in which the academic staff involved in the implementation of the programme presents the course outline and academic methods to their colleagues and discuss improvements that would ensure a higher quality of the programme content and meet the current trends in the field, at the same time experts did not find formal mechanisms facilitating internal collaboration.

## **Conclusions by specifying the strengths and weaknesses**

### Conclusions:

Compliance of programme with requirements set forth in the regulatory enactments is grounded, this is justified by 6 annex. The academic staff by means of participation in target oriented activities such as extensive cooperation with foreign Universities, projects realization, activities in publications and participating in different conferences along with participation in different international organizations, cooperation with stakeholders in industry provides necessary quality level in programme realization.

The qualification of the teaching staff members formally complies with the requirements for the implementation of the study programme and has a high potential for programme further development.

The number of research publications by the members of academic staff involved in the implementation of the study programme with citation in Web of Science/Scopus is impressive.

There is an extensive list of research-related projects with involvement of academic staff (13 annex). The experts have validated this information during discussions with academic staff and it corresponds with reality. Experts may conclude that results of research and projects are integrated in the study courses and presented to students.

The experts overall are aware about collaborative activities for academic staff in the sphere of programme content development.

### Strengths:

1. Academic staff of the programme is in full compliance with requirements set forth in regulatory documents, has necessary qualification and experience as stated by Resolution of Council of Higher Education of Latvia (in annexes). The overall stability of academic staff during 2013-2020, its education, experience, and activity in R&D guarantee the sustainable development of the programme in future.

2. The qualification of the teaching staff members allows to maintain sustainable development of the Programme.

3. The strong interrelation between the study process and R&D activity.

4. Overall good level of intensity of scientific publications.

5. The information obtained during research and project activity is not scholastic data, but is used in the study process.

6. An annual review of the courses of the study programme takes place as well as dedicated seminars.

7. Academic staff activities in collaborative efforts to improve programme content and academic methods serve also as triggers for staff self assessment.

### Weaknesses:

1. Comparatively broad range of publication topics. The need for concentration in the scope of the programme field is required.

2. Absence of widespread information about formal mechanisms facilitating internal collaboration.

3. A possible disbalance between teaching staff activities in R&D and study process.

## 5. Assessment of the Compliance of the Study Programme "Computerised Control of Electrical Technologies"

### Requirements

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

**Assessment of compliance:** Fully compliant

The sample of the diploma (Appendix no. 17) fully complies with the procedure by which state-recognised documents of higher education are issued. (Cabinet Regulation No. 202 "Procedures for Issuing State-Recognized Higher Education Documents"). As the programme is realized in English, the diploma text for issuing it for foreign students should not be separate, but doubling the paragraphs in Latvian. The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202. However, as these are purely technical discrepancies, in experts opinion they do not affect the overall assessment of this criteria.

2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Confirmation of the possibility for students to continue their education between the doctoral study programs "Computerised Control of Electrical Technologies" and "Power and Electrical Engineering" / "Smart Power Systems" is provided in Description of the Study Direction (SAR, Rector's confirmation, document No 01000-2.2.1-e/207).

3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "On compensation of losses in case the study program is not accredited, or the license of the study program is revoked, and a student does not wish to continue studies in another study program", document No 01000-2.2.1-e/178)

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the

State Fee for Examining the Proficiency in the Official Language” (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex “On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction “Power Industry, Electrical Engineering, and Electrical Technologies”, document No 02000-2.2.1-e/118).

- 5 5. 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.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Vice-Rector's for Academic Affairs confirmation (SAR, Annex “On the foreign language knowledge of the teaching staff involved in the implementation of study programs corresponding to the study direction “Power Industry, Electrical Engineering, and Electrical Technologies”, document No 02000-2.2.1-e/117).

- 6 6. 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.

**Assessment of compliance:** Fully compliant

Fully compliant based on “On compliance of the academic staff involved in implementation of the doctoral study programs of the study direction “Power Industry, Electrical Engineering, and Electrical Technologies” with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Higher Education Institutions” (SAR, Confirmation of the Vice-Dean of Science, document No 02000-2.2.1-e/119).

- 7 7. 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 Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant based on “On compliance of the academic staff involved in implementation of the doctoral study programs of the study direction “Power Industry, Electrical Engineering, and Electrical Technologies” with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Higher Education Institutions” (SAR, Confirmation of the Vice-Dean of Studies, document No 02000-2.2.1-e/116).

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 “Mandatory Provisions to be Included in the Study Agreement” (SAR, Annex “Sample of Study Agreements”).

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Partially compliant

Study course descriptions are fully in compliance with the Law on Institutions of Higher Education Section 561, Paragraph two.

(SAR, Annex "REDO Course ENG"). The explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education is missing.

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

**Assessment of compliance:** Not relevant

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant in concordance with the Council of Higher Education resolution. (Document No 1.10/27)

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

**Assessment of compliance:** Not relevant

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

- 14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG\_jauns" and CV's of academic staff).

- 15 R5 - Overall rating

**Assessment of compliance:** Partially compliant

The study programme is partially compliant with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments. Courses which are dictated by the Environmental Protection Law and Civil Protection Law is missing from the programme. A few other technical improvements could be in place. See more in recommendations regarding this study programme.

## Requirements (R6-R8)

- 1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

**Assessment of compliance:** Fully compliant

Evaluation of programme study resources and provision in different forms (scientific, informative, material and technical, financial) allows overall with small deviations in form of offered improvements to make statement, that existing complex of resources and activities is professionally balanced, has excellent planning and management and aimed to provide an opportunity to increase the competitiveness, quality, and efficiency of the study and R&D process at Faculty and programme level.

- 2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

**Assessment of compliance:** Fully compliant

Academic staff of the programme is in full compliance with requirements set forth in regulatory documents, has necessary qualification and experience. Extensive cooperation with domestic and abroad universities ensures a very positive development vector for the faculty and programme. Academic staff from partner universities invited to participate in the implementation of the study programme, attraction of young specialists as well as industry professionals provide good coverage of fundamental and applied research, commercialization actions and represent diversity of forms of target oriented strategy.

- 3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

**Assessment of compliance:** Partially compliant

Experts may conclude that results of research and projects are integrated in the study courses and presented to students. For example, the results of the European international projects LITES, ERDF uMOL and ERDF SAVAS are used as lecture material, laboratory work and practical calculation tasks in the study courses "Energy Efficient Lighting", "Introduction to Specialisation". In addition, the AREUS Project Laboratory is used for this study course in addition to practical work in the course "Control and Regulation of Electrical Drives". Since 2016, Dr.sc.ing, Production Planning Engineer from Mercedes-Benz delivers the study course "Fundamentals of Industrial Robotics". Some modern topics, for example, Distributed computer control systems (DCCS) should be described in study courses in more detail.

## **Conclusions by specifying the strengths and weaknesses**

Conclusions:

Creating innovative and competitive environment, it is possible to attract young researchers offering them opportunity to develop their PhD Theses for promotion of new research, creation of new products and services. Scientific support is constantly used in the form of R&D projects realization. Successful cooperation has been developed with the staff of the domestic and foreign universities, which ensures the improvement of the professional skills of employees and the exchange of students and employees. Informative provision of programme is at a very high level due to common resources of RTU. Material and technical provision are conducted both by RTU own resources and by stakeholders funding and initiatives. The constant improvement and modernization of M&T base, the

modern equipment and established laboratories are successfully used in the study process, students' research, and in the development of graduation papers. Financial provision as is seen from programme self assessment report is constantly growing, it has different funding sources. Study provision in mentioned forms is in compliance with requirements of the study process and its objectives, it responds to nowadays needs of industry. The potential of provision demonstrates the ability to ensure sustainable development. But there are some small gaps in the advances and findings in the relevant field of science such as: Distributed computer control systems (DCCS) should be described in study courses in more detail.

#### Strengths:

1. Sufficiency of resources for sustainable development of programme study process and R&D activities. Extensive list of laboratories ( 14 annex) testify about the compliance of resources.
2. Well-developed studying environment with additional facilities and services, which is highly motivating for the staff and students.
4. Informative provision of programme is at a very high level due to common resources of RTU.
5. Financial provision as is seen from the programme self assessment report is constantly growing, it has different funding sources.
6. Study provision in mentioned forms is in compliance with requirements of the study process and its objectives, it demonstrates the ability to ensure sustainable development.
7. Academic staff of the programme is in full compliance with requirements set forth in regulatory documents, has necessary qualification and experience as stated by the Resolution of Council of Higher Education of Latvia ( in annexes).
8. Extensive cooperation with domestic and abroad Universities ensures a very positive development vector for the Faculty and Programme.
9. Academic staff from partner universities invited to participate in the implementation of the study programme, attraction of young specialists as well as industry professionals provide good coverage of fundamental and applied research, commercialization actions and represent diversity of forms of target oriented strategy.
10. The existing possibilities for R&D is used overall effectively and target- oriented.
11. Due to the internal quality assessment system, the documentation is in good shape and quality. All indicators and formal attributes are specified at a high level, corresponding to the current regulations. The interrelation between components of indicative evaluation is visible and undoubted.
12. Methodical complex of programme corresponds to high standards. The content is relevant, ensures the achievement of the learning outcomes, and meets the needs of the relevant industry and the scientific trends.
13. There is a sense about relevancy with industry and modern scientific trends.
14. Individual cooperation with scientific adviser-professor.
15. There is an elaborated and professionally used reference system which ensures the improvement of the quality of study system. There are different ways for implementation of the system, for example, through the ORTUS platform.
16. There is an extensive list of international universities, cooperation with them leads to a higher level of students' knowledge, skills and competences as result of participation at study courses implemented by other internationally recognized higher education institutions.
17. The elaborated system for mobility providing is working, the results are evaluated and outcomes achieved during such mobility are recognized.
18. Sufficiency of resources for sustainable development of programme study process and R&D activities. Long list of partners in the sphere of international cooperation, real use of offered possibilities.
19. Academic staff of the programme is in full compliance with requirements set forth in regulatory documents, has necessary qualification and experience as stated by Resolution of Council of Higher

Education of Latvia (in annexes). The overall stability of academic staff during 2013-2020, its education, experience, and activity in R&D guarantee the sustainable development of the programme in future.

20. The strong interrelation between the study process and R&D activity.

21. Overall good level of intensity of scientific publications.

22. An annual review of the courses of the study programme takes place as well as dedicated seminars.

23. The high level of R&D activities.

24. The qualification of the teaching staff members allows to maintain sustainable development of the Programme.

25. Academic staff activities in collaborative efforts to improve programme content and academic methods serve also as triggers for staff self assessment.

Weaknesses:

1. Insufficient quantity of English language study courses for Doctoral students to be able to apply knowledge of foreign language at the level of international scientific discourse.

2. Recommended literature in study courses descriptions is in most cases outdated.

3. Distributed computer control systems (DCCS) should be described in study courses in more detail.

4. In the diploma sample provided some technical discrepancies can be observed.

5. Comparatively broad range of publication topics. The need for concentration in the scope of the programme field is required.

6. Absence of widespread information about formal mechanisms facilitating internal collaboration.

7. A possible disbalance between teaching staff activities in R&D and study process.

8. The explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education is missing.

9. There is not enough information for foreign students in English on the ORTUS platform about surveys aimed to improve the quality of the study process.

## **Evaluation of the study programme "Computerised Control of Electrical Technologies"**

Evaluation of the study programme:

Good

## **6. Recommendations for the Study Programme "Computerised Control of Electrical Technologies"**

### **Short-term recommendations**

Until the hearing of Study Quality Committee, the diploma issued for foreign students should not be separated, but doubling the paragraphs in English under the Latvian text and it should be reviewed and aligned with the Cabinet Regulations No. 202.

Add additional information for foreign students in English in ORTUS platform about surveys aimed to improve the quality of study process. Before the session of Accreditation Commission

To develop a formal stimulating mechanism facilitating internal collaboration between members of academic staff. Before the session of Accreditation Commission

Until the hearing of the Study Quality Committee, the explanation about realization of courses which are dictated by the Environmental Protection Law and Civil Protection Law for students, who might not have fulfilled the course in previous education, should be defined.

Integrate into programme courses modules, topics concerned with distributed computer control systems, especially in the sphere of electrical power supply systems. During 2 year period.

Ensure the concentration of publication topics in the scope of the programme field. During 2 year period.

To develop the methods for elimination of imbalance between involvement of academic staff in study process, research work, work at enterprise in industry. During 1 year period.

### **Long-term recommendations**

Extend the availability and quantity of English courses in Programme planning. Before next planned Accreditation

Update the Recommended literature in study courses descriptions. Before next planned Accreditation.

## **II. "Smart Power Systems" ASSESSMENT**

### **II. "Smart Power Systems" ASSESSMENT**

#### **1. Indicators Describing the Study Programme**

##### **Analysis**

The name of the study programme "Smart Power Systems" and the degree "Doctor of Science (Ph.D.) in Electrical Engineering, Electronics, Information and Communication Technologies" are interrelated. The study programme is interrelated with the aims, the objectives, the learning outcomes, and the admission requirements. The aim of the study programme is to prepare internationally competitive specialists of the highest qualification. Full time and extramural time of studies enables the students to study or to study and work to complete the studies in a way, which is more appropriate for their status. Full time studies in Latvian and in English language takes 4 years. Part time extramural studies in Latvian and in English language takes 6 years. Volume of both study forms is 192 CP. The conductance in Latvian and English language enables internationalization of the study programme. Admission requirements (appropriate degree - master degree of engineering or comparable education - required. Knowledge of English language is required if student will study in English - The knowledge of English is tested for applicants to studies in English) are appropriate for the study programme and relate with the programme learning outcomes. The doctoral programme Smart Power Systems is a stable and well maintained study programme and it is interrelated with the degree to be acquired, with the aims, the objectives, the learning outcomes, and the admission requirements.

Name of the study programme Smart Power Systems is related to the current developments in the field of studies.

Duration of studies is different for full time and part time studies, which allows optimization of time of students.

#### **Conclusions by specifying the strengths and weaknesses**

#### Conclusions:

The doctoral programme Smart Power Systems is a stable and well maintained study programme and it is interrelated with the degree to be acquired, with the aims, the objectives, the learning outcomes, and the admission requirements.

#### Strengths:

1. Name of the study programme Smart Power Systems is related to the current developments in the field of studies.
2. Duration of studies is different for full time and part time studies, which allows optimization of time of students.

#### Weaknesses:

1. Not really related only to Smart power systems, but anyway: the Latvian local credit system is not in accordance with the European Credit Transfer and Accumulation System (ECTS) used in the Bologna system.

## **2. The Content of Studies and Implementation Thereof**

### **Analysis**

The descriptions of the study courses and the final theses are of acceptable quality and comply with the provisions set forth in the regulatory enactments. Full time studies in Latvian and in English language takes 4 years. Part time extramural studies in Latvian and in English language takes 6 years. The descriptions of study courses are prepared using special forms. The content of the study is relevant and it complies with the aims of the study programme. This allows the achievement of the learning outcomes. In addition, it meets the needs of the industry and complies with the scientific trends. The Study Programme has been redesigned and is implemented in close cooperation with industry representatives who are members of the Latvian Association of Power Engineers and Energy Constructors (LEEA).

The studies itself and the evaluation methods of student knowledge contribute to the achievement of the aims and learning outcomes of the study courses and the study programme. Students have their assignments and prepare their own research work. Graduates of the study programme usually demonstrate considerably better results than the requirements stated (e.g. one anonymously peer-reviewed scientific publication in a journal indexed in SCOPUS with a Source Normalized Impact per Paper (SNIP) or indexed in Web of Science, with a certain Impact Factor (IF) indicator, e.g. have conducted research within a research project, e.g. have used modern methods of data analysis and processing within the research).

The outcomes of the surveys conducted among the students, employers, and graduates are used to improve the quality of studies in terms of feedback provided. At the end of any study year, every doctoral student who is involved in active studies can fill in the survey form regarding that study year, which requires registration in the ORTUS portal. The survey form consists of three parts:

The students are informed about the mobility opportunities and the learning outcomes achieved during the visits are recognised. Some mobilities were realised, although not in a large number, which is also related with the number of students.

The content of the study programme covers the latest topics in the field. The administration of the Study Programme is planning to continue to continuously improve the implementation of the study processes, considering the suggestions made by students, alumni, and the industry.

The number of students is small so supervisors have enough time for their relations with their students.

Small number of students cannot provide objective feedback about the study process, so the feedback is subjective regarding the positions of the responding students.

### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The content of the study programme and its implementation satisfies all 4 stated criteria.

Strengths:

1. The content of the study programme covers the latest topics in the field.
2. The number of students is small so supervisors have enough time for their relations with their students.

Weaknesses:

1. Small number of students cannot provide objective feedback about the study process, so the feedback is subjective regarding the positions of the responding students.

### **3. Resources and Provision of the Study Programme**

#### **Analysis**

The study facilities, the library, the material and technical conditions and financial conditions are suitable for the achievement of the learning outcomes. They allow a high-quality study process.

The study facilities and the scientific support comply with the requirements for the implementation of the doctoral study programme. They allow achievement of learning and research outcomes. They allow a high-quality study process. Examples, which support these statements: wide electronic access to scientific literature through modern library, digitisation of classrooms, centralised research support system, which records all information on publications, patents, commercialisation applications, doctoral theses.

### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The study facilities, the library, the material and technical conditions and financial conditions are suitable for the achievement of the learning outcomes. They allow a high-quality study process.

Strengths:

1. Faculty building and new infrastructure represent the strength of the study programme.

Weaknesses:

None identified.

### **4. Teaching Staff**

#### **Analysis**

1. The faculty undertakes measures to improve the composition of the teaching staff. The study programme is characterised by a large proportion of young academic staff (71.4 % are below the age of 50) and the qualifications of academic staff, which ensure theoretical and research potential.

2. The qualification of the teaching staff members involved in the implementation of the doctoral study programme complies with the requirement. All teachers hold PhD degrees. The qualified teaching staff enables the achievement of the aims and learning outcomes of the study programme and the relevant study courses.

According to the tasks of the study programme, the primary criteria by which academic staff is selected are as follows:

- knowledge about the recent achievements and participation in scientific and research projects in

their field;

- state-of-the-art teaching skills in the relevant field;
- experience working with foreign students.

The list of staff qualified for teaching together with their qualifications shows that the teachers conform to all stated criteria.

3. The scientific publications of the teaching staff involved in the implementation of the doctoral study programmes contribute to the implementation of a high-quality doctoral study programme.

4. Some teachers have significant connections to the industry, which enables participation or conductance in application projects. The teaching staff is involved in application and research projects. The teaching staff at least partly work in scientific research both at national and international level. The obtained information is used in the study process.

5. The teaching staff cooperates in projects which in turn means that they can cooperate in sense of the improvement of the study courses and modules.

### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

Some teachers have significant connections to the industry, which enables participation or conductance in application projects. As it is the case at other similar institutions, some teachers are more and some are less involved in scientific research projects, which represent the standpoint for publications.

Strengths:

1. Teachers are closely connected with the industry.

Weaknesses:

1. The quality and quantity of publications can be affected by the amount of cooperation with industry on industrial projects, which may limit the time for scientific publications of the highest quality and consequently of their citations.

## **5. Assessment of the Compliance of the Study Programme "Smart Power Systems"**

### **Requirements**

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

**Assessment of compliance:** Fully compliant

The sample of the diploma (Appendix no. 14) fully complies with the procedure by which state-recognised documents of higher education are issued. (Cabinet Regulation No. 202 "Procedures for Issuing State-Recognized Higher Education Documents"). As the programme is realized in English, the diploma text for issuing it for foreign students should not be separate, but doubling the paragraphs in Latvian. The introductory paragraph in the Diploma Supplement provided in English should be reviewed and aligned with the Cabinet Regulations No 202. However as these are purely technical discrepancies, in experts opinion they do not affect the overall assessment of this criteria.

2. Documents confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued.

**Assessment of compliance:** Fully compliant

Confirmation of the possibility for students to continue their education between the doctoral study programs "Computerised Control of Electrical Technologies" and "Power and Electrical Engineering" / "Smart Power Systems" is provided in Description of the Study Direction (SAR, Rector's confirmation, document No 01000-2.2.1-e/207).

3. Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Rector's confirmation (SAR, Annex "On compensation of losses in case the study program is not accredited, or the license of the study program is revoked, and a student does not wish to continue studies in another study program", document No 01000-2.2.1-e/178).

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

**Assessment of compliance:** Fully compliant

The academic staff's official language knowledge fully complies with the Cabinet of Ministers Regulation No. 733 of 7 July 2009 "Regulations Regarding the Extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official Language and the State Fee for Examining the Proficiency in the Official Language" (SAR, RTU Vice-Rector's for Academic Affairs confirmation, annex "On the knowledge of the state language of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/118).

5. 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.

**Assessment of compliance:** Fully compliant

Full compliance can be found in RTU Vice-Rector's for Academic Affairs confirmation (SAR, Annex "On the foreign language knowledge of the teaching staff involved in the implementation of study programs corresponding to the study direction "Power Industry, Electrical Engineering, and Electrical Technologies", document No 02000-2.2.1-e/117).

6. 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.

**Assessment of compliance:** Fully compliant

Fully compliant based on "On compliance of the academic staff involved in implementation of the doctoral study programs of the study direction "Power Industry, Electrical Engineering, and Electrical Technologies" with the provisions set out in Section 55, Paragraph one, Clause three of

the Law on Higher Education Institutions” (SAR, Confirmation of the Vice-Dean of Science, document No 02000-2.2.1-e/119).

- 7 7. 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 Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant based on “On compliance of the academic staff involved in implementation of the doctoral study programs of the study direction “Power Industry, Electrical Engineering, and Electrical Technologies” with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Higher Education Institutions” (SAR, Confirmation of the Vice-Dean of Studies, document No 02000-2.2.1-e/116).

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

**Assessment of compliance:** Fully compliant

Fully compliant with Cabinet regulations No 70 “Mandatory Provisions to be Included in the Study Agreement” (SAR, Annex “Sample of Study Agreements”).

- 9 9. 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 56.1, Paragraph two and Section 56.2, Paragraph two of the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Study course descriptions are fully in compliance with the Law on Institutions of Higher Education Section 561, Paragraph two. (SAR, Annex No 8)

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

**Assessment of compliance:** Not relevant

- 11 11. 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 Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant in concordance with the Council of Higher Education resolution. (Document No 1.10/05)

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

**Assessment of compliance:** Not relevant

- 13 13. The joint study programmes comply with the requirements prescribed in Section 551, Paragraphs one, two, and seven of the Law on Institutions of Higher Education (if applicable).

**Assessment of compliance:** Not relevant

14 14. Each member of the academic staff has either publications published in reviewed editions within the last six years, including international editions (if they have worked for a shorter period of time, the number of publications shall be in proportion to the work period), or artistic creation achievements (for instance, exhibitions, films, theatre performances, and concert activity), or a five-year practical work experience (except for the experience in the implementation of the study programme) in accordance with the Law on Institutions of Higher Education.

**Assessment of compliance:** Fully compliant

Fully compliant according to the information provided in SAR (Annex "List of publications of academic staff 2014-2021", "Mācībspēku saraksts ENG\_jauns" and CV's of academic staff).

15 R5 - Overall rating

**Assessment of compliance:** Fully compliant

The study programme is fully compliant with the legal requirements set forth in the Law on Institutions of Higher Education and other regulatory enactments.

### **Requirements (R6-R8)**

1 R6 - The compliance of the study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of the learning outcomes.

**Assessment of compliance:** Fully compliant

Study complies with legislation, scientific support is assured, informative support is assured, technical and financial background is assured and learning outcomes can be achieved.

2 R7 - The compliance of the qualification of the academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments.

**Assessment of compliance:** Fully compliant

Teaching staff members are qualified.

3 R8 - The study programme leading to the master or doctoral degree is based on the advances and findings in the relevant field of science or artistic creation.

**Assessment of compliance:** Fully compliant

Study programme is relevant and based on advances in smart power systems.

### **Conclusions by specifying the strengths and weaknesses**

Conclusions:

The study program is compliant with the requirements.

Strengths:

1. Supervisors do not have too many students, which enables enough time for timely feedback.

Weaknesses:

1. In the diploma sample provided some technical discrepancies can be observed.

### **Evaluation of the study programme "Smart Power Systems"**

Evaluation of the study programme:

Good

## 6. Recommendations for the Study Programme "Smart Power Systems"

### Short-term recommendations

Until the hearing of Study Quality Committee, the diploma for issuing it for foreign students should not be separated, but doubling the paragraphs in English under the Latvian text, it should be reviewed and aligned with the Cabinet Regulations No 202.

Maintain programs of teaching courses to reflect the recent developments in the field.

### Long-term recommendations

Stimulate teachers to publish their research internationally in recognized journals with impact factors.

Establish an environment for easier integration of visiting teachers.

Not really related only to Smart power systems, but anyway: the Latvian local credit system is not in accordance with the European Credit Transfer and Accumulation System (ECTS) used in the Bologna system.

## 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 21 of the Law on Institutions of Higher Education, the higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study direction whilst implementing their internal quality assurance systems:	Fully compliant	RTU has several mechanisms for study quality improvement, including RTU Quality Policy as well as RTU Excellence Approach and the mechanisms for evaluating teaching staff, getting feedback and updating relevant study programmes (SAR pp., 11.-15.)

<b>Requirements</b>	<b>Requirement Evaluation</b>		<b>Comment</b>
R2 - The cooperation with different organisations from Latvia and abroad implemented within the study direction ensures the achievement of the aims of the study direction.	Fully compliant		RTU has 36 cooperation agreements in place, within different areas of interest revolving around studies, mobility and scientific research with foreign higher education institutions (SAR, p. 95, Annex "Collaborative universities.doc") The cooperation implemented in RTU contributes to the specific features of the study field and the programmes within it.
R3 - Compliance of scientific research and artistic creation with the development level thereof (if applicable).	Fully compliant		RTU has developed mechanisms for the involvement of the teaching staff in scientific research. Summary of scientific research can be found in SAR, Annex "List of publications academic staff 2014-2020", however the experts lack information about the scientific publications of some of the academic staff members.
R4 - Elimination of the shortcomings and deficiencies identified during the previous assessment of the study direction, if it has been conducted, or the implementation of the provided recommendations.	Fully compliant		Taking into account the information given in SAR, its annexes and information acquired during the on-site visit it is evident that the previous recommendations have been implemented.

#### **Assessment of the Requirements for the Relevant Study Programmes of the Study Field**

<b>No.</b>	<b>Study programme</b>	<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>	<b>Evaluation of the study programme (excellent, good, average, poor)</b>
1	Adaptronics (42522)	Partially compliant	Fully compliant	Fully compliant	Not relevant	Good

No.	Study programme	R5	R6	R7	R8	Evaluation of the study programme (excellent, good, average, poor)
2	Computerised Control of Electrical Technologies (42522)	Fully compliant	Fully compliant	Fully compliant	Not relevant	Good
3	Adaptronics (47522)	Partially compliant	Fully compliant	Fully compliant	Fully compliant	Good
4	Computerised Control of Electrical Technologies (47522)	Partially compliant	Fully compliant	Fully compliant	Fully compliant	Good
5	Smart Power Systems (47522)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good
6	Computerised Control of Electrical Technologies (51522)	Partially compliant	Fully compliant	Fully compliant	Partially compliant	Good
7	Smart Power Systems (51522)	Fully compliant	Fully compliant	Fully compliant	Fully compliant	Good

### The Dissenting Opinions of the Experts

This document needs to represent a common view of all the experts in clear and correct sentences (elimination some subjective opinions of certain individuals). The sentences should not include suggestions in terms, how the solutions of the problems need to be resolved. The subjective opinions of an individual needs to be eliminated in the process of a group discussion when a common evaluation is performed. This document is not a good one and I am not proud to be a part of it. I think that it is not beneficial for the organisation under the evaluation, if ambiguous requirements/recommendations/weaknesses compose the document. I think that this report contain several sentences written in a poor language. I think that several sentences are written in a way that the reader cannot understand, what is the problem, and how the issue under the evaluation can be improved. I could not see diploma samples, because I was not physically present at the faculty, but only on distance, so regarding the related issues: I have to rely to local experts, who were there. Conformance to regulation and related recommendations are the next point, where I needed to rely on local experts (but it is strange to me that so eminent Faculty would not comply to all the written

regulations and rules).