APPLICATION

Study field "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science" for assessment

Study field	*Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science*
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Self-evaluation report

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

Rēzekne Academy of Technologies

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1. Information on the Higher Education Institution/College

1.1. Basic information on the higher education institution/ college and its strategic development fields,.

RTA was founded in 1993 under the name of Rezekne Higher Education Institution with the aim to develop culture, education and science in Latgale region and throughout Latvia. In 2016, Rēzekne Higher Education Institution changed its name to Rezekne Academy of Technologies, respecting its academic and scientific capacity development indexes, implementing the goal defined by its Constitution - to provide students with academic and professional higher education that is competitive in the European education space and complies with the level of scientific development and Latvian cultural traditions, by developing regional studies and research.

RTA vision in line with RTA operating and development strategy 2016-2023 (RTA Strategy) is to become an internationally competitive Academy of Technologies in the space of European higher education and science integrated with engineering, social sciences and humanities with motivated and creative students that are demanded in the labour market and an open, dynamic academic and scientific environment for sustainable development of the community.

RTA mission is to contribute to the transformation and growth of society and economy through education, research, science and innovation providing new products and technologies in the scientific fields and interdisciplinary fields represented by RTA both nationally and internationally.

The long-term goal set in the RTA Strategy is to strengthen RTA strategic role in Latgale region, in the system of Latvian and European higher education and scientific institutions, positioning itself as an academy of technologies focusing on the development, acquisition, research, popularization and application of multidisciplinary technological solutions.

In the academic year 2021/2022 RTA study process is implemented in 3 faculties, 12 study directions and 37 study programmes (see Table 1.1.) at all study levels - from short cycle professional higher education to doctoral study programmes.

Table 1.1.

Study directions implemented at RTA

Fakulty of Engineering (FE)	**Faculty of Economics and Management (FEM)**	**Faculty of Education, Languages and Design (FELD)**

• „"Architecture and Construction" • "Information Technology, Computer Engineering, Electronics, Telecommunications, Computer Management and Computer Science" • "Mechanics and Metalworking, Heat Power Industry, Heat Engineering and Mechanical Engineering" • "Production and processing"	• "Management, Administration and Real Estate Management" • "Internal Security and Civil Defence" • "Law" • "Economics"	• „“Social Welfare” • "Arts" • "Education, Pedagogy and Sport” • "Translation"

According to Cabinet of Ministers regulations no. 449 of 21.06.2022. "On the strategic specialization of state universities", RTA has the initial strategic specialization in the following fields of science: engineering and technology (thematic areas of education - engineering and technology, computer science) and social sciences (thematic areas of education - teacher education and educational sciences, commercial studies and administration, social and behavioral sciences).

RTA study and research infrastructure are located in Rezekne at Atbrivosanas aleja 115. Some study programmes are implemented at RTA branches in Madona and Livani, which were established at the request of Madona and Livani municipality in order to support the preparation of qualitative workforce in accordance with regional development strategies. Since 2017 study programmes are not implemented in Madona, but Livani branch is implementing first level professional higher education study programme “Mechanical Engineering”, which is in line with Livani county development strategy and is aimed at training and employment of specialists in local enterprises.

In 2015 RTA founded Eastern Latvia High School of Technologies, where the general secondary education programme is implemented in STEM fields in order to promote the purposeful and systematic preparation of students for studies in science, technology, engineering and mathematics. In Latvia’s school rankings of 2022, in the group of small schools, ATV takes the 4th place among 47 small schools in Latvia.

Number of students at RTA from 2013 to 2022 show some degree of persistence (see Figure 1.1.)

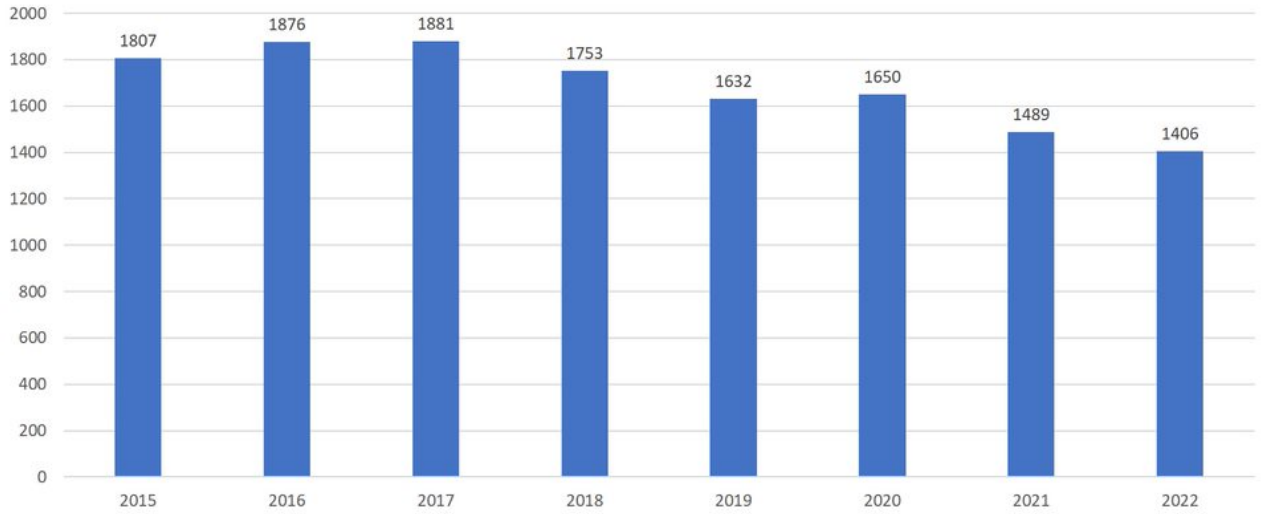

Figure 1.1. The dynamics of the number of students at RTA 2015-2022

According to the statistics data 2021 of the Central Statistical Bureau, RTA is the 6th largest higher education institution among 16 state universities and the 10th largest among 29 state and private education institutions.

RTA operates in accordance with the RTA strategy, strategy, which defines its main strategic objectives:

O1. To ensure purposeful, coherent and successive implementation of STEM and resource-intensive study direction geared towards the development, acquisition and application of innovative technologies in Latgale region by preparing specialists necessary for Latgale, Latvia and European economic growth, promoting the involvement of young specialists in science and research.

O2. To offer science-based, interdisciplinary study programmes focused on the acquisition, application and development of innovative technologies, attractive and modern study and research environment, preparing competitive professionals for regional, national and international job markets and enhancing study quality.

O3. To implement the principle of unity of pedagogical and research work, to develop the scientific research capacity of RTA academic staff, ensuring technological excellence and transfer for the development of business environment and national economy.

O4. To create a modern and sustainable RTA infrastructure complex and modern equipment particularly developing STEM and resource-intensive directions for fundamental and applied research, excellent study environment and innovation support.

O5. To develop the attractiveness of the region by involving academic staff and students of RTA in the social, cultural and economic life of Latgale, sustainable use of resources, preservation and circulation of the region's cultural and historical values.

Each objective has tasks and main short-term (until 2019) and long-term (until 2023) outcomes.

The RTA Strategy defines and annually measures and analyzes the main quality indicators of RTA activities - *Key Performance Indicators (KPI)* -

- dynamics of the number of students;
- number of foreign students;
- graduate employment;
- the number of companies founded by graduates;
- matriculation competition coefficient;
- the amount of financial resources raised;
- the percentage of academic staff with a doctoral degree;
- scientific qualification of academic staff,
- the number of doctoral theses defended;
- the number of patents obtained and licenses sold.

1.2. Description of the management structure of the higher education institution/ college, the main institutions involved in the decision-making process, their composition (percentage depending on the position, for instance, the academic staff, administrative staff members, students), and the powers of these institutions.

In accordance with the RTA Constitution, RTA is an autonomous educational and scientific institution with self-governing rights. Its autonomy is expressed in the right to freely choose the types and forms of implementation of tasks set by RTA founder that are in compliance with the Law on Higher Education Institutions (Only in Lavian), as well as in responsibility for the quality of education provided by RTA, purposeful and rational use of financial and material resources, observance of the principles of democracy and the laws regulating the activities of higher education institutions.

RTA has the right to draft and adopt RTA Constitution, to form RTA staff, independently determine the content and forms of study programmes, student enrolment regulations, basic directions of scientific research work, RTA organizational and management structure, pay wage rates not lower than those set by the Cabinet of Ministers and to do other activities that do not contradict the principles and tasks set by the RTA founder and the Law on Higher Education Institutions. See the RTA management structure in Annex 2.

The main RTA institutions involved in the decision-making process are the Constitutional Assembly, the Senate, the Student Council, the Study Council, the Science Council, the Faculty Council, the Study and Direction Council. See Table 1.2.1 for their composition and description of their powers.

Table1.2.1.

Main RTA bodies involved in RTA decision-making process

RTA decision-making bodies	Structure of the institution	Power of the institution
RTA Council	On May 10, 2022, the government approved the composition of the RTA Council. As a university of applied sciences, RTA's council consists of five members: two representatives nominated by the Ministry of Education and Science and approved by the Cabinet of Ministers, one representative nominated by the President of the country and two representatives nominated by the RTA Senate.	The activities of the RTA Council are regulated by the Regulations approved by the Council. The councils are responsible for the sustainable development of RTA, its strategic and financial supervision, as well as the operation of RTA in accordance with the goals set in its development strategy. The RTA Council protects the autonomy of the RTA, as well as respects the academic freedom of the academic staff and students and promotes its implementation. The competence of the Council is determined by Article 14.2 of the Law on Higher Education Institutions.

Constitutional Assembly	39 representatives of academic staff, 9 general staff and 12 students.	Adopts and amends the regulations of the RTA Constitutional Assembly and accordingly adopts and amends the RTA Constitution, elects RTA Senate, approves or amends RTA Senate regulations, revokes RTA Senate members, elects and dismisses RTA Rector, hears RTA Rector's report, elects RTA Academic Arbitration court, approves its regulations, as well as considers other issues of RTA in accordance with the regulations of RTA Constitutional Assembly.
Senate	19 representatives of academic staff members, 1 general staff member and 5 students	Approves the rules and regulations governing all areas of RTA.
Student Council	21 student representatives - 7 from each faculty.	Represents RTA students' interests in the study, science and culture issues participates in the work of RTA institutions (Constitutional Assembly, Senate, Academic Arbitration Court, Faculty Council, Scholarship Commission, Credit Granting Commission, Study Programme Self-Evaluation Preparation Working Group), develops and implements projects related to students' interests.
Study Council	Vice-Rector for Studies and Science, Head of the Study Department, Deans, one Head of the Faculty, Deputy Rector for Cooperation and Development, Head of the Lifelong Learning Centre, Head of the Academic Direction of the Student Council	Analyses the study system and determines its improvement and development directions. Evaluates academic and professional study programmes and controls their content and quality. Analyses study budget projects and their implementation. Researches and introduces Latvian and foreign experience in the field of higher education.
Science council	RTA Rector, Vice-Rector for Studies and Science, Deans of Faculties, Heads of Institutes, Project Coordinator, Head of Science Department and Head of Library, Academic Director of the Student Council	By assessing the scientific potential of RTA, the material and financial resources to be used for research, the interests of the research community and individual scientists, it identifies the main directions of research and, through the opportunities available to RTA, facilitates the involvement of scientific and academic staff.

Faculty Council	The Dean of the Faculty, the professors and associate professors elected by the Faculty and RTA, the heads of study directions of the respective faculty, the student representatives, whose proportion in the Council shall not be less than 20% of the composition of this Council.	Defines the basic directions and principles of the development of studies, scientific activities and material and technical base in the faculty. Develops the faculty development concept and controls its implementation. Elects the Dean and heads of the structural units of the faculty. Approves study plans. Approves changes to the content of the study programme if they do not exceed 20% of the content of accredited study programme. Approves and controls the financial estimates of the faculty. Evaluates and directs study field self-evaluation reports, licensing / accreditation materials for approval to the Study Council. Decides on the organizational issues of the faculty scientific and academic conferences. Approves the proposals of the study directions regarding the composition of state and final examination commissions and time of these examinations.
Study Direction Council (SDC)	Directors of the study programmes and modules	SDC plans, coordinates and promotes scientific activities, the development of SD studies and scientific infrastructure, the activities of SDC in the study, research and other projects for the development of the study direction. SDC decides on the main issues of SD study, methodological, scientific and organizational activities, development of study programmes/modules, making significant changes in the study programmes, organization of internships, methodological and organizational provision and management of study research, regular, final and state examinations, planning, preparation and publishing of scientific literature, ensuring self-assessment of SV, co-operation with employers, Latvian and foreign institutions in the field of studies and research, promotion of SD and study programmes in society.

List of RTA laws and regulations, see Annex 1.

1.3. Description of the mechanism for the implementation of the quality policy and the procedures for the assurance of the quality of higher education. Description of the stakeholders involved in the development and improvement of the quality assurance system and their role in these processes.

RTA quality management system is maintained based on the priorities in higher education set forth in the European Higher Education Standards and Guidelines for Quality Assurance and the Higher Education Act.

RTA's Quality Management System (QMS) has been developed in line with the Excellence model taking into account the Standards and Guidelines for the Quality Assurance in Higher Education Area elaborated by the European Foundation for Quality Management (EFQM) and ISO9000: 2015 standard recommendations. RTA quality policy is aimed at RTA mission, sustainable development and achievement of strategic goals by providing high-quality study process and scientific work that meets standards and regulatory requirements. RTA has approved QMS implementation plan till 2020, which is fulfilled. RTA has developed and implemented all procedures related to study quality management, supervision and improvement. Since 2005 there is a **study quality management system** in RTA that covers all major areas of study work: compliance of study process with RTA development strategy, academic staff, study program, study process, infrastructure, financing, etc. quality aspects.

The **development of the quality assurance system at** RTA is managed by a quality management system specialist whose duties include analyzing, developing, implementing and maintaining RTA's quality management system. In order to ensure quality and improvement, working groups, which operate in accordance with the plan approved by RTA Rector, are formed taking into consideration RTA current tasks. Since December 2021, the **RTA quality management system process management improvement and automation working group** develops and implements the RTA Quality Management System development plan for the current academic year. The work plan covers the creation and implementation of supporting information in the study process and research.

Both **internal** and **external** (consultative) structures are involved in RTA quality assurance. Internally, quality management is ensured at all levels. RTA quality management involves senior, middle and junior **managers** who are responsible for quality management in their area of supervision. Senior managers (Rector, Vice-rector of studies and sciences, Vice-rector for cooperation and development, Executive director) are responsible for the work of RTA as a whole. They develop operational policy, strategy and manage RTA development processes. The highest-level employees are responsible for the effective operation of RTA, resolve internal conflicts within the organization in their sphere of supervision. The task of the seniour managers is to appoint a management representative, who, regardless of other duties, is given the power, duties and responsibilities, which include the creation, implementation, maintenance and improvement of the processes of the quality management system, regularly informing the top managers about the current improvements of the quality management system, as well as systematically identifying needs of RTA personnel for ensuring quality processes. Middle-level managers (Deans, Head of the Studies Department, Head of the Science and Project Management Department, Head of the Center for Lifelong Learning, Head of the Library, Directors of Institutes, etc.) are responsible for the quality of the work of the groups subordinate to them, their collaboration, group motivation to work and and move towards common values. Lower-level managers (Heads of Study Directions, Programme Directors, Project Managers) are responsible for the work assigned to them, but are not responsible for the work of other managers. They contact each of the members of their group, motivate them to perform work, organize group work. The role of **RTA staff** (academic, general, students) involved in quality management is defined in RTA quality management policy and is aimed at multifaceted involvement of all staff in quality assurance, including both evaluation of quality processes and direct involvement in initiation and implementation of quality improvements. At the external level, RTA's convention of advisors and expert councils of study directions are involved in quality assurance. They participate in quality assessment activities and provide

consultations on quality improvement issues.

1.4. Fill in the table on the compliance of the internal quality assurance system of the higher education institution/ college with the provisions of Section 5, Paragraph 2(1) of the Law on Higher Education Institutions by providing a justification for the given statement. In addition, it is also possible to refer to the respective chapter of the Self-Assessment Report, where the provided information serves as justification.

1.	The higher education institution/ college has established a policy and procedures for assuring the quality of higher education.	An RTA quality manual has been developed(see Annex 1, Document 1) which also covers the RTA quality policy, quality management principles, the descriptions of quality criteria assessment cycle, quality management organizational structure and quality process and risk management issues, and is available in the RTA document management system. Quality management procedures are embedded in RTA's internal normative documents (rules, procedures, regulations), which cover all areas of quality assurance and are available in RTA's document management system.
2.	A mechanism for the creation 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.	The regulation on academic and professional studies and study programmes at RTA(see Annex 1, Document 2) defines the procedure for developing, approving and making changes to study programmes (including joint study programmes). The annual self-evaluation procedure of the study directions and related study programmes regulates the monitoring and quality control of the study programmes (see Annex 1, Document 3). In order to evaluate the performance of study programmes, RTA has created expert councils of study directions(see Annex 1, Document 4), which participate in the evaluation of study programmes and provide consultations on improving the quality of studies.
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.	Methodical recommendations have been developed for a study quality system based on learning outcomes(see Annex 1, Document 5), which determines the principles of defining learning outcomes for the study programme, study course, study module, as well as the principles of evaluating learning outcomes. The Regulations on study course exams and tests set the general requirements (see Annex 1, Document 6) of the learning outcome tests. The Regulations on State and Final examinations(see Annex 1, Document 7) determine the conditions for organizing final examinations at RTA. All regulatory documents are placed in RTA's internal document management system, which is available to all personnel.

4.	Internal procedures and mechanisms for assuring the qualifications of the academic staff and the work quality have been developed.	The RTA Academic Staff Development Plan 2018-2023(see Annex 1, Document 8) determines the planning, evaluation and professional development measures of the academic staff. The Regulations on the RTA Lecturer(see Annex 1, Document 9) stipulates the rights, duties and responsibilities of teaching staff. The procedure for assessment of the quality performance of the academic staff(see Annex 1, Document 10) defines the academic staff assessment principles that are based on student-centered education. RTA implements Professional development programme of academic staff in university didactics (for new teaching staff) or higher education innovations (for experienced teaching staff).
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.	Students' and graduates' surveys are organized in accordance with the annual self-evaluation procedure of the study direction and corresponding study programmes(see Annex 1, Document 3). The results are placed in a summarized form in the RTA's internal document management system in the Quality management section. An analysis of the survey data is available in the annual study programme self-evaluation reports. Since 2022, self-evaluation reports are available in RTA's internal document management system. Every year, RTA prepares an annual report, which is publicly available on the RTA website. https://rta.lv/assets/files/documents/rta-gadagramata-20212022.pdf (Only in Lavian)
6.	The higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study field whilst implementing their quality assurance systems.	Continuous improvement, development and work efficiency of the study course is ensured by the annual self-evaluation procedure of study courses(see Annex 1, Document 3) and periodic external evaluation of study courses and study programmes. The basis for the development of study programmes is the recommendations received during licensing or accreditation and the recommendations received during the annual self-evaluation process, on the basis of which the study programme development plans are developed and implemented.

2.1. Management of the Study Field

2.1.1. Aims of the study field and their compliance with the scope of activities of the higher education institution/ college, the strategic development fields, as well as the development needs of the society and the national economy. The assessment of the

interrelation of the study field and the study programmes included in it.

Vision

The Study Field "**Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science**" (hereinafter – SF) is a training centre for highly qualified technical engineering and engineering science specialists in Eastern Latvia in the field of information technologies.

SF development strategy

The development of the SF is in line with the strategic objectives of the RTA as defined in the RTA Operational and Development Strategy for 2016-2023 – strengthening the strategic role of RTA in the Latgale region, the Latvian and European System of Higher Education and Scientific Institutions, positioning itself as a technology academy, focusing on the development, acquisition, exploration, promotion and application of multisectoral technological solutions, by reinforcing the essential role of interdisciplinary links in the development of higher education and science in Latvia, primarily by reducing factors that hinder the growth of Latgale region, guaranteeing the development and practical marketing of innovative products needed for traditional economic sectors, the creative and cultural industries. The IT SF is one of the strategic specialisation lines of the RTA implemented in line with the common challenge of the EU: A Europe fit for the digital age.

Purpose of the SF

Based on the strategic planning documents: The European Commission's priorities 2019-2024, "Digital transformation guidelines for 2021-2027" and "RTA Operational and Development Strategy 2016-2023", as well as in consultation with employers, professional organisations, the Council of Engineering Faculty, has sets the goal of the field of study: the implementation and development of a stable, sustainable and flexible science-based higher education system in Latgale region to prepare the world labour market for competitive information technology specialists.

Study Direction Tasks:

1. To implement vocational and higher education standards-relevant study programmes: "Programming and Computer Network Management" short cycle study program, the professional bachelor's programme "Programming Engineer", the professional master's training programme "Computer systems", the academic master's training programme "Electronic commerce information systems", the doctoral programme "Modeling of social engineering systems" (join study program with Vidzeme University of Applied Science (ViA)).
2. Ensure the continuity and linkage of study programmes to the needs of the labour market through targeted cooperation with employers and professional or ganisations.
3. Offer a flexible research-based study process involving students and teaching staff in Contract research and scientific projects.
4. Provide a model for the management of the study field and an internal quality system based on the quality policy of the RTA covering the staff, trainers, students, employers and society as a whole of all parties involved in the quality assurance of the study field.
5. It is strengthening the international competitiveness of the course of study by maintaining a strategic partnership network for the mobility of students and staff.

The implementation of all study programmes complies with the SF aim, tasks, RTA Strategy,

development needs and tendencies of the society and national economy. The study direction takes into account the strategic challenges of the European Union and Latvia for enabling Industry 4.0, as well as the Latgale Development Program 2030, predicts that developing ICT networks in the region will reduce the “digital divide” in the area and provide new business opportunities.

All the study programmes are interconnected. The Short Cycle Study Programme "Programming and Computer Network Management" has been developed as part of the "Programming Engineer" programme of the professional bachelor's studies. In the period 2017-2022, 8 graduates continued their studies at the bachelor's level. Graduates of the bachelor's program can continue their education in the Master's degree program "Electronic commerce information systems." In the period 2017-2022, 23 graduates of the bachelor's program continued their studies in the RTA master's study program. In turn, master's degree beneficiaries can continue their studies in the joint doctoral programme "Modeling of sociotechnical systems." 9 masters have continued their studies in the doctoral study program.

2.1.2. SWOT analysis of the study field with regard to the set aims by providing explanations on how the higher education institution/ college expects to eliminate/ improve weaknesses, prevent threats, and avail themselves of the given opportunities, etc. The assessment of the plan for the development of the study field for the next six years and the procedure of the elaboration thereof. In case there is no development plan elaborated or the aims/ objectives are set for a shorter period of time, information on the elaboration of the plan for the development of the study field for the next assessment period shall be provided.

For operation assessment and development planning of the SF a regular evaluation of its strengths, weaknesses, opportunities and threats is performed.

Strengths of the SF:

- Virziena studiju programmas aizpilda noteiktu nišu akadēmiskās, zinātniskās darbības, profesionālās ievirzes un tālākizglītības jomā atbilstoši darba tirgus mainīgajām prasībām.
- Profesionālo un akadēmisko studiju programmu saturs atbilst valsts profesionālās augstākās izglītības standartiem un profesijas standartu prasībām un ir saskaņots ar darba devēju pieprasījumu.
- Programmās darbojas kvalificēts akadēmiskais personāls un praktizējoši IT speciālisti.
- Lielākā daļa absolventu strādā ar IT saistītajās jomās.
- Iespējas iegūt izglītību visos studiju līmeņos
- Sekmīga sadarbība ar pašvaldībām, valsts iestādēm un uzņēmējiem.
- Nodrošināta studiju, pedagoģiskā un zinātniskā darba sinerģija.
- Nodrošināta starptautisko mobilitāšu iespēja personālam un studentiem.

SF weaknesses:

- Personāls dažādu iemeslu dēļ nepietiekami aktīvi izmanto starptautiskās apmaiņas iespējas.
- Neliels ārzemju studentu skaits studiju programmās, ko RTA var īstenot angļu valodā.
- Nepietiekama personāla skaita kapacitāte iesaistei valsts un starptautiska līmeņa projektos.
- Liels studējošo atbirums.

SF opportunities:

- Akadēmiskā personāla stažēšanās Latvijas un ārvalstu uzņēmumos, nodrošinot teorijas un prakses vienotību, ārzemju pieredzes efektīvāku izmantošanu studiju procesā.
- Jaunu mācību līdzekļu izstrāde, t.sk. digitālā formā.
- Akadēmiskā personāla aktīvāka iesaiste starptautiskās mobilitātes pasākumos.
- stiprināt docētāju atalgojumu, atbalstot viņu iesaisti zinātniskos projektos vai līgumpētījumos;
- plašāka sadarbība ar IT uzņēmumiem, iesaistot to personālu studiju procesā, īstermiņa apmācības un prakses programmās , *bootcamp*, atklātajām lekcijām utml.;
- tālmācības studiju forma.

SF threats:

- Demogrāfisko faktoru ietekmē notiek Latvijas studējošo skaita samazināšanā.
- Ārējo faktoru dēļ (epidemioloģiskā, nacionālās drošības situācija, COVID 19 pandēmija) samazinājies Latvijas un ārzemju studentu skaits.
- Atalgojuma sistēma augstākajā izglītībā nemotivē reģionālo augstskolu akadēmiskā un zinātniskā potenciāla attīstību.

Measures to reduce the impact of weaknesses and prevent threats are reflected in the SF development plan in Annex 3. The plan is developed after consultations with partner companies, municipalities, professional associations. The joint doctoral study programme Laser Technologies, which is implemented in partnership with the “Angel Kanchev” University of Ruse in Bulgaria and the Mittweida University in Germany, plays a special role in the implementation of the development plan. This programme significantly increases the competitiveness of the SF and allows to provide several of the opportunities presented in the SWOT analysis. It facilitates: 1) RTA's strategic specialisation in the field of laser technologies, attracting experienced foreign partners with the opportunity to take over the experience of Bulgaria and Germany; 2) renewal of academic staff and involvement of young scientists in study and research work; 3) international cooperation in science, preparation and implementation of joint scientific projects, increasing the number of publications in high citation index journals, improving skills of English; 4) creation and management of intellectual property.

In 2016, there was established Institute for Engineering to increase the scientific capacity; unites all staff employed in the field of engineering and coordinates preparation of scientific projects and scientific publications. To facilitate preparation of scientific publications, the RTA has established a fund of scientific publications, where additional funding for the development of scientific publications is available to each scientist. In order to promote development of international research projects, RTA participates in the ERDF project Support to International Cooperation Projects in Research and Innovation at Rezekne Academy of Technologies, which provides support for networking, learning research mobility activities, participation in Horizon 2020 and EU 9. Partnership exchanges and information days organized within the framework programme; participation in international scientific conferences.

In order to increase the English competence of the academic staff, SF lecturers participate in the ERDF project Strengthening the RTA academic staff in the study fields “Mechanics and Metalworking, Heat Power Engineering, Heat Engineering and Mechanical Engineering” and “Management, Administration and Immovable Property Management”, where 32 members of the teaching staff improve their professional competence doing in-service training with merchants, learning professional English, developing specialised competencies in the leadership, cooperation and digital field.

2.1.3. The structure of the management of the study field and the relevant study programmes, and the analysis and assessment of the efficiency thereof, including the assessment of the role of the head of the study field and the heads of the study programmes, their responsibilities, and the cooperation with other heads of the study programmes, as well as the assessment of the support by the administrative and technical staff of the higher education institution/ college provided within the study field.

The SF is created in accordance with 11.12.2018 Cabinet Regulation No. 793 "Regulations Regarding Opening and Accreditation of Study Fields". The management of SF of RTA is subject to the Regulations "On Study Field Councils", "On Study Programme/ Module/ Specialization Directors", "On Faculty Board" approved by the Senate. For the most important collegial institutions involved in the management of the SF see Annex 4.

The SF management structure established by RTA ensures the following essential principles of RTA's internal quality:

- involvement of staff – all stakeholders are involved in the SF implementation – students, lecturers, general staff, employers, graduates;
- evidence-based process management – each unit has clearly defined duties, rights and responsibilities;
- continuous learning and improvement – created conditions for exchange of knowledge, introduction of innovations and improvements.

The directors of study programmes are decisive in the implementation of SF; they form the SF Council chaired by the head of the SF.

Director of the study programme:

- develops a study programme considering the demand for relevant specialists in the labour market, justifying by surveys conducted for this purpose, statistical data and other documents proving the demand;
- prepares the study programme for review in RTA's collegial and advisory institutions,
- manages the self-assessment process of his/her programme,
- performs the duties related to the study programme implementation: preparation of study plans, coordination of the study programme learning outcomes with the study course learning outcomes, consultations for students and teaching staff, popularisation of the study programme, etc.

Head of SF:

- plans the work of SF Council;
- manages the preparation of SF self-assessment, licensing and accreditation materials, also involving academic staff and students;
- organises assessment of the activities of the staff employed in the study programmes.

SF Council:

- decides on all the main issues of study, methodological, scientific and organizational activities of the SF, including development of study programmes/modules, significant changes in study programmes, organisation of traineeships, methodological and organisational provision and management of study research, current, final and state examinations, planning, preparation and publishing of study methodological and scientific

literature, provision of self-assessment of SF and study programmes, cooperation with employers, Latvian and foreign institutions in the field of studies and research activities, popularisation of study programs in society;
- plans, coordinates and promotes scientific activities, development of studies and scientific infrastructure, activities in studies, research and other projects for the development of the SF. On 27.01.2015, the Senate of RTA approved the “Regulations on Study Field Councils of RTA” introducing a new model of SF administration, establishing a Study Field Council, which includes the directors of all study programmes.

General meeting of SF:

- meets at least three times an academic year;
- nominates and approves the composition of the Study Field Council by the majority of votes present;
- evaluates information about the topical measures and tasks of the SF implementation;
- evaluates the report of the head of the SF on the accomplished during the semester and academic year;
- evaluates reports of the academic staff on the completion of workload.

For the efficient operation of the SF, the RTA has support structural unit staff:

- Specialists of the study process of the Faculty of Engineering: responsible for record keeping and organisational issues of the study process at the faculty level.
- Specialists of the study process of the Department of Studies: responsible for maintenance of SF data in LAIS, VIIS, Moodle systems, Multirank, academic staff workload planning, maintenance of lecture schedules, preparation of diplomas and diploma appendices, reports, references and other documents on study issues.
- Personnel Department specialists: prepare personnel documentation (incl. Employment Contract), carry out introductory instruction of personnel.
- Employees of the Lifelong Learning Centre: organise professional development courses in higher education institution didactics and innovations.
- Library: participates in planning of study and scientific literature, ensures availability of electronic databases, is responsible for updating the content of the RTA institutional repository, maintains the database of the RTA’s academic staff publications.
- Scientific and project management department: supports planning and implementation of training, scientific, infrastructure projects, commissioned research.
- Financial analyst: plans the financial resources of the SF and study programmes.
- Information Communication Technology Research Centre: maintains electronic open access databases conferences.rta.lv, journals.rta.lv.
- Institute for Engineering: ensures synergy of pedagogical and scientific work, plans and implements scientific projects in the field of engineering sciences and related interdisciplinary industries, performs research and practical support for strengthening the scientific capacity of the SF.

The management system of the SF and the corresponding study programmes can be assessed as well-thought-out, coordinated, based on democratic principles. It receives the necessary support in all basic issues of the SF: study process record keeping, scientific activity, financial planning, lifelong learning, etc. The strengths of the management model: detailed division of responsibilities of the parties involved in the management process, stipulated in the regulations of structural units and job descriptions of officials, developed procedures in all issues of implementation of the SF and its corresponding study programmes, a transparent decision-making system accessible to all parties involved.

The management model of the SF and its corresponding study programmes covers various activities related to the implementation and development of the study process. The model provides for involvement of many departments and persons. This poses a threat to effective management. For instance, the objectively possible influence of the human factor in management becomes topical, which actually manifests itself as risks, insufficient management staff providing comprehensive management of processes in their field of supervision, coordinating the professional and academic activities of the teaching staff, and other factors.

RTA's Quality Management Policy provides for several directions to reduce management risks. They include staff consolidation, professional development measures, the opportunity to resolve work situations in a collegial manner, reviewing them pursuant to the Code of Ethics of RTA.

For transparency of the management process and availability of management decisions, RTA introduced the Electronic Internal Document Management System aimed at prevention of management quality risks, harmonized documentation management and control of operation.

The directors of all study programmes belong to the Council of the study field, where the issues relevant to the study field are decided together, problems are solved, and the development scenarios of the study field are discussed. Programme directors closely cooperate within the process of preparation of accreditation materials, the process of preparation and implementation of project applications, execution of commissioned research, involvement of students from different study programmes in joint projects, organisation of conferences. Study programme directors work as lecturers in other study programmes.

2.1.4. Description and assessment of the requirements and the system for the admission of students by specifying, inter alia, the regulatory framework of the admission procedures and requirements. The assessment of options for the students to have their study period, professional experience, and the previously acquired formal and non-formal education recognised within the study field by providing specific examples of the application of these procedures.

Admission to study programmes of RTA is subject to the Admission Regulations approved by the Senate (see Rules for Admission to RTA (Only in Latvian) .They are based on Cabinet Regulation No. 846 Regulations Regarding the Requirements, Criteria and Procedures for Admission to Study Programmes. of 10.10.2006.

Admission to undergraduate (short cycle, bachelor) programmes requires secondary education acquired previously. Students are admitted in an open and equal competition based on the results of centralised exams. The Admission Regulations of RTA prescribe three centralised examinations: Latvian, mathematics and a foreign language. The tender selection criterion is the results of the completed math, Latvian and foreign languages CE (foreign language CE assessment may be replaced by an international test (ST) assessment, following regulation No 795(only in Latvian) of MK 20.12.2022) at one of the learning levels (general, optimal or higher) of the learning content (general) at the choice of the person and the results of all other centralised examinations of the person. A coefficient shall be determined for comparing the effects of examinations of the various levels of learning of the learning content:

- level of learning of the higher learning content – 1;
- the optimal learning level of the learning content – 0,75;

- general learning level – 0.5;
- For all CE completed by 2022, including as well as for national checks carried out in vocational education establishments 2022/2023, 0,75;
- the assessment obtained by the international testing authorities in a foreign language shall not be lower than C1 - 1;
- the assessment obtained in the test of international testing bodies in a foreign language shall be at least B2-0,75.

Additional points are awarded for the annual mark in the certificate of secondary education in informatics, physics, chemistry, natural sciences. In order to select the strongest and most motivated students, RTA has determined the possibilities of receiving additional points to the winners of first, second and third places and recognitions in the Latvian State Competitions in mathematics, physics, informatics (programming), Russian, German and French, to the graduates of the Eastern Latvian Secondary School of Technology and secondary vocational education (related to the field of information technology or computer science).

A master's programme of a duration of 1, 5 years shall host applicants who have obtained a vocational or academic degree or higher vocational education (duration of studies of at least four years (160 KP), including a practice of at least 20 KP or a length of service of at least one year, recognised following Cabinet regulation No 36 of 10.01.2012) in electronic commerce or computer in science or information technology or the economy or driving sciences, or comparable to previous higher education, which includes at least 60 KP of the relevant college courses from the professional bachelor's study programme "E-commerce", the corresponding mandatory and mandatory parts of the previous higher education programme.

A master's study programme with a duration of 2 years shall accommodate applicants holding a professional or academic degree (time of studies is three years (120 KP) or higher vocational education (time of studies of at least four years (160 KP) but no practice at least 20 KP) in electronic commerce or computer science or information technology, economics or social sciences, in which include at least 60 KP relevant study courses from the appropriate mandatory and mandatory parts of the prior higher education programme from the "E-commerce" vocational bachelor's study programme
The doctoral programme shall include persons with a master's degree in modelling sociotechnical systems, computer systems, information technology, computer science or engineering, and natural sciences if a course of studies related to mathematical and/or imitation modelling has been completed during studies. The theme of promotion work should align with the science sub-sector and the environment for the application of the doctoral programme (business, tourism, community management, logistics, information systems).

Admission Regulations for each subsequent study year are approved by the Senate of RTA and published on the home page by 30 November of the current year.

RTA has developed and introduced procedures for the recognition of qualification and competencies acquired through non-formal education or professional experience and learning outcomes achieved through previous education, which correspond to the Cabinet Regulation No. 505 "Regulations on Recognition of Competences and Learning Outcomes Acquired Outside Formal Education or in Professional Experience"(only in Latvian). In accordance with the "Regulation on Recognition of Competences Acquired outside the Formal Education or through Professional Experience and Learning Outcomes Acquired in Prior Education by RTA" approved by the RTA Senate the recognition procedure is performed by the Commission for Engineering and Information Technologies, which examines the applications of applicants and makes a decision regarding the recognition of learning outcomes or refusal to recognise the learning outcomes. During the period

from 2016./2017.academic year 6 student applications for recognition of professional practice have been examined and confirmed in the amount of 20 KP. In 2022./2023.academic year two additional applications have been received in the course of the evaluation.

Moreover, RTA has developed and, pursuant to the Lisbon Convention, consistently applies the procedures for recognising previous education when transferring from another higher education institution (HEI) to RTA, transferring from one RTA study programme to another, resuming studies after a break, after first/second level professional higher education acquisition by continuing studies for the acquisition of a bachelor's degree or second level professional higher education, after studies within the framework of cross-border or inter-university agreements. For example, since 2017, previous education recognition issues have been addressed in the course of study programmes for 70 students; in 39 cases the study courses have been aligned with other RTA programmes, others from Latvia (RTU, DU, LLU, LKA, TSI, ViA, RSU, etc.) and foreign universities (Kaunas College, Vilnius University).

The procedures for the recognition of academic courses are determined by the Regulations on Academic Recognition of Study Courses at RTA approved by the Senate. Pursuant to the ERASMUS Charter 2021-2027, RTA fully recognises the study period acquired in ERASMUS mobilities abroad.

Admission of foreign students to RTA takes place pursuant to the Admission Regulations. Admission requirements for undergraduate programs are: an annual mark in the subject in the document on secondary education, which is equated to a centralized examination (mathematics; basics of economics; English). In addition, applicants must pass an online test in mathematics and an interview for studies at RTA. Admission requirements for master's studies are the second level higher education or an academic bachelor's degree in economics, marketing or administration (duration of studies at least 4 years, 160 CP). In addition, applicants shall take an interview for studies at RTA. Admission requirements for the doctoral level are discussions on the problems viewed in the admission paper or submitted set of publications, evaluation of the master's thesis, number of publications in cited publications and participation in scientific conferences, number of publications in general publications and participation in local conferences, experience in management or analytics. All additional requirements are agreed and approved by the Higher Education Council.

All foreign applicants must submit a language proficiency certifying document issued by an international testing institution within the past five years, which certifies the foreigner's proficiency in English at least at the level B2. It is not required to attach the document, if the foreigner has acquired the previous education in English. If there is no International Certificate of English proficiency or the language of previous education was not English, the applicant has to pass the examination. The result of the examination will be passed if the English knowledge comply at least with the level B2.

2.1.5. Assessment of the methods and procedures for the evaluation of students' achievements, as well as the principles of their selection and the analysis of the compliance of the evaluation methods and procedures with the aims of the study programmes and the needs of the students.

The procedure for evaluation of student achievements at RTA is elaborated to ensure consistent application of the student-centred approach. The principles of evaluation at RTA are determined by methodological recommendations Study Quality System Based on Learning Outcomes (only in

Latvian), Regulations on Examinations and Tests of Study Courses, on State and Final Examinations approved by the RTA Senate, Methodological Recommendations for Organising Students' Independent Work approved by RTA Study Council. The evaluation of the student's work during traineeship in the proffesional programmes of study field is stipulated in the traineeship guidance developed exactly for these programmes.

The main principles of learning outcome evaluation at RTA:

- **Correspondence** of learning outcome evaluation methods **to the study programme and learning outcomes defined for the study course**. RTA teaching staff incorporates the requirements for the assessment of learning outcomes into the study course programmes, which are evaluated and approved at the meeting of the SF Council. During the assessment, the attention is paid to the compliance of the assessment requirements and procedures with the achievement of the study programme aims, the total workload of students, as well as preventing possible duplication of the content of study courses.
- **Clarity, consistency and public availability** of requirements for evaluation of learning outcomes **to students**.RTA teaching staff incorporates the requirements for evaluation of learning outcomes into the study course programme, which is published on the RTA e-course website ekursi.rta.lv and available to students starting the study course acquisition. In cases when the teaching staff delays in publishing the study programme on the e-course website, they receive a repeated invitation and reminder that the requirements for the evaluation of learning outcomes must not change during the implementation of the study course.
- **Balanced application of measures for evaluation of learning outcomes during the study course implementation period**, providing for that the examination grade consists of the results of formative evaluation during the semester (at least 40% of the evaluation) and evaluation at the end of the study course (60%). Such a system allows to follow the progress of students' study achievements, motivates students for a purposeful study process during the semester, as well as lightens the psychological and physical workload of examination during sessions.
- **Evaluation of** students' **independent work**, which is a mandatory element of the study process, its content and evaluation are reflected in the content of study courses. The SF Council shall decide about most suitable types of independent work of the SF, agreeing on the independent work amounts, opportunities to make bigger student groups for independent work, and other issues.
- **The right of students to request explanations** and to contest the evaluation according to the procedures established in the Regulations on Examinations and Tests of Study Courses, on State and Final Examinations.
- As far as possible, **several evaluators participate** in the evaluation of learning outcomes. Such a system is applied at RTA during defence of study research works and professional traineeships.
- The learning outcomes in the compulsory and limited elective part are evaluated with a grade in the 10-point system (examination or differentiated test), in the elective course part it is allowed to evaluate the learning outcomes with 'passed'/'failed'.

All information about the summative assessment of learning outcomes is available to students in the LAIS environment, where each student is granted access. The results of the formative evaluation are partially available on the RTA e-course website ekursi.rta.lv

2.1.6. Description and assessment of the academic integrity principles, the mechanisms for compliance with these principles, and the way in which the stakeholders are informed.

Specify the plagiarism detection tools used by providing examples of the use of these tools and mechanisms.

The principles of academic integrity and their application in RTA are subject to the Regulations "Plagiarism Control and Prevention Rules at RTA" approved by the Senate and harmonised with the Copyright Law, Code of Ethics for Scientists, Code of Ethics of RTA and Student Rules and Regulations of RTA (see Only 27 paga). Plagiarism control and prevention measures at RTA are applicable to the study process and academic and scientific activities of the academic staff.

In the study process, measures to control and prevent plagiarism are taken in the course of formative assessment, developing, submitting and defending such written and oral works, which contain the elements of research work and which provides for work with sources, statistical data and literature (study work, course paper, report, presentation , article, etc.). Particular attention is paid to anti-plagiarism measures in the process of development, evaluation and defence of final theses (qualification papers, diploma projects, master's theses, doctoral theses).

From 2014, the final research works at RTA are tested in the Unified Computerized Plagiarism Control System of Latvian Higher Education Institutions (Only in Latvian). Each case of identified data match is evaluated at the meeting of the Study Field Council, inviting the director of the respective study programme and the supervisor of the final study research work. The Study Field Council may request oral or written explanations from the student whose work is suspected of plagiarism. Qualifying the established facts as plagiarism, the Study Field Council proposes to the Dean exmatriculation of the student. In the programmes of the study field there has never established plagiarism. Every year, at the beginning of the last study semester, there is a general meeting organised for students and their supervisors on the elaboration of state final examinations. It also provides information on how to avoid plagiarism in student works. Consequently, the plagiarism risk is minimized.

To control plagiarism, RTA has purchased and uses the plagiarism detection system PlagScan, which controls the materials uploaded to the study website ekursi.rta.lv and operates on the RTA conference administration website conferences.rta.lv and on the free access website journals.rta.lv, where scientific articles of the teaching staff and students of the study field are also published in open access. In addition, the RTA staff uses also publicly available anti-plagiarism platforms, such as plag.lv, plagium.com, plagiarismchecker.com, plagiarisma.net, etc.

In addition, RTA systematically carries out educational and informative activities related to intellectual property issues. Representatives of the Patent Office of the Republic of Latvia, who cooperate with the RTA Library, give regular guest lectures at RTA. For example, the Patent Office seminars Protection of Intellectual Property (Industrial Property. Copyright)" on 19.02.2019, Topical Issues in the Patent System on 17.03.2017, etc. Also in the framework of the Lifelong Learning Centre professional development programme Innovations in Higher Education, RTA organises guest lectures and courses on issues related to academic ethics. For example, in the period from 05.11.2021 until 26.11.2021 there is an online lecture series Academic Ethics and Integrity conducted by Dr.sc.soc., MS Bioethics Signe Mežinska. On 13 December 2022, Major Ronalds Mandelis, Commander of the Home Guard Cyber Defence Unit, visited RTA to give a lecture on cyber security.

2.2. Efficiency of the Internal Quality Assurance System

2.2.1. Assessment of the efficiency of the internal quality assurance system within the study field by specifying the measures undertaken to achieve the aims and outcomes of the study programmes and to ensure continuous improvement, development, and efficient performance of the study field and the relevant study programmes.

In order to achieve the aims and outcomes of the study programmes, continuous improvement, development and efficiency of the SF and the corresponding study programmes, RTA has established an Internal Study Quality Assessment and Control System (Quality System), where the following areas are subject to internal assessment:

- Compliance of the study process with the Development Strategy (development policy) of RTA,
- Quality of the academic staff,
- Quality of the study programmes,
- Quality of cooperation with applicants and graduates,
- Quality of the study process,
- Infrastructure quality,
- Funding and quality of economic activity.

The quality of implementation of the SF and corresponding study programmes is subject to regular assessment pursuant to the procedures for internal evaluation of the study fields and programmes approved by the Study Council of RTA. Until 2021, the quality assessment was a multi-level process:

- The **self-assessment working group** approved by the Dean prepared a self-assessment report annually, evaluating therein the areas defined in the Quality System; for the self-assessment report, the working group summarised the statistics of the study field in the preceding year and the results of surveys. If necessary, additional opinions were asked from experts selected by the self-assessment working group.
- The SF self-assessment **was subsequently discussed** in the Council of the Study Field and the Faculty Council and approved by the Senate. The proposals formulated in the discussion process are incorporated into the study programme or its implementation procedures.

The first self-assessment reports of the SF until the academic year 2017/2018 are available at RTA home page. They contain the assessment of both the SF and each study programme corresponding to the SF, and the summary of the most important development plans of the SF. Sākot ar 2021.g. studiju virzienu pašvērtējumi atrodas RTA iekšējā dokumentu vadības sistēmā, kur notiek regulāra to papildināšana, izvērtēšana un apstiprināšana RTA noteiktajā kartībā.

Each of the Quality System areas in RTA is documented, however, improvements cannot be ruled out. The Quality System of RTA is developed in such a way to receive regular feedback on the quality SF implementation. There are several ways to achieve it:

- Since 2020, pursuant to the annual self-assessment procedure for the study fields approved by the Study Council of RTA and the corresponding study programmes, RTA implements a successive self-assessment procedure for SF and study programmes, identifying and regularly evaluating the most important quality indicators of study process pursuant to the evaluation calendar. Annual self-assessment includes such **aspects of SF quality** as the completion progress of the accreditation/licensing recommendation plan, SWOT evaluation of SF, evaluation of the SF development plan, analysis of annual enrolment results in study programmes, evaluation of the number of students and student movement, identified

plagiarism cases and anti-plagiarism measures, analysis of survey results, analysis of study literature, evaluation of teaching staff, mobility measures, traineeship agreements, professional standards, study courses implemented with a problem-based approach, student achievements, evaluation of material and technical base, other information. Self-assessment materials are stored up in RTA's internal document management system.

- Conducting annual surveys of students, graduates and employers, performing their assessment and performing the improvements initiated during the assessment of the surveys;
- in addition, RTA uses the opportunity to participate in international platforms for analysis of individual study quality indicators, for example, in 2021/2022. RTA participated in the system StudentPlus for collection and analysis of student study experience, regularly conducting questionnaires and evaluating student experience during their studies.
- Implementing the changes proposed at the national level in order to ensure the pooling of resources, increase in the quality of studies and succession of study programmes, at the faculty council's meeting, a decision was taken to stop the professional master's study programme "Computer Systems", which is not applied for external evaluation. The justification for closing the program is the small number of students over several years.

For the implementation of the joint doctoral study program, a joint program quality management system has been developed, which covers all areas of program implementation, starting from admission to obtaining the doctorate of science degree.

2.2.2. Analysis and assessment of the system and the procedures for the development and review of the study programmes by providing specific examples of the review of the study programmes, the aims, and regularity, as well as the stakeholders and their responsibilities. If, during the reporting period, new study programmes have been developed within the study field, describe the procedures of their development (including the process of the approval of study programmes).

The documents of the Study Quality Management and Control System:

Quality Management Handbook

Study results-based study quality system at RTA (Only in Latvian)

Development and reviewing of study programmes at RTA are governed by the Regulations on academic and professional studies and study programmes approved by the Senate and it determines the schedule of planning new study programmes, involved parties and the procedure. The main principles for development of study programmes are:

- **connection** of the study programme development **with the main strategic and planning documents**: Activity and Development Strategy of the Rezekne Academy of Technologies 2016-2023 and Study Programme Development and Consolidation Plan 2018-2023 (Only in Latvian). The study field corresponds to the strategy of RTA.
- **regular revision of the content and implementation of the study programmes**, ensured in accordance with the procedures for development and approval of annual study plans as well as the process of the study field self-evaluation. In the process of the annual approval of study plans, evaluation of such aspects as content of the study programme, coherence of the study course programmes and the learning outcomes of the study

programme, the compliance of the teaching staff with the implemented study programmes is carried out every year. After approval of the study plans by the Faculty Board, the teaching staff shall update the study course programmes and submit the updated versions for inclusion in the Information System of Latvian Higher Education Institutions (LAIS) as well as on the website of e-courses of RTA.

- ensuring regular feedback via surveys of **students**, **graduates and employers.** Results of the surveys are discussed in the Study Quality Commission of RTA, at the meeting of the Council of the Study Field and, whenever possible, taken into account revising the content of study programmes or their implementation procedures. Students shall submit their proposals for improvement of the study process.
- cyclical **external evaluation** of study programmes, coinciding with the procedures for accreditation of study fields stipulated in the Republic of Latvia. An essential aspect of external evaluation are the recommendations of the Expert Commission regarding improvement of the study field and study programmes, that shall be integrated in the development plans of the study field and study programmes afterwards, outlining a schedule, resources and those responsible for the implementation thereof.

During the reporting period, changes were made to the professional bachelor's study programme "Programming Engineer", proposing that the programme can be implemented in English.

In 2022, the accreditation process was applied for to change the name of the first-level professional higher education programme "Programming and Computer Network Administration" to "Programming".

2.2.3. Description of the procedures and/or systems according to which the students are expected to submit complaints and proposals (except for the surveys to be conducted among the students). Specify whether and how the students have access to the information on the possibilities to submit complaints and proposals and how the outcomes of the examination of the complaints and proposals and the improvements of the study field and the relevant study programmes are communicated by providing the respective examples.

All normative documents are available on RTA's internal server, which is accessible to all students in all RTA premises. The most important legal acts regulating students' rights are summarized in the publication “My Academy”, electronic internal document managemrnt system. The procedures for the submission of student complaints and proposals are provided for in the RTA internal regulations (see Table.2.2.3.1).

Table 2.2.3.1.

Students' right to submit complaints and proposals provided for in RTA internal regulations

Complaint about exmatriculation	to rector	Student regulations (4.5)(see the link on page 29)
	possibility of appeal to the Senate	Student regulations (4.5)
Suggestions on the study process	in the Dean's Office	Student regulations 3.3.4.
To lodge an appeal against assessment of State Examination	to the Vice-Rector for studies and science	Regulations on state and final tests (27-33)
To lodge an appeal against assessment of examination and test	to the Dean	Regulations on examination and tests of study courses (6.1. - 6.5.)
To appeal the decisions of the RTA Academic Arbitration Court	In accordance with the procedures prescribed by the Administrative procedure law.	RTA Constitution (Latvian only)
The Students' Council has the right to: ● to request and receive information and explanations from authorized representatives of any RTA department on issues related to interests to students, ● to use veto rights in the Constitutional Assembly, the Senate and the Faculty Council on issues affecting students' interests, ● to participate in RTA decision-making bodies and participate as observers in tests and examinations in accordance with RTA legislation; ● to propose the adoption, amendment and repeal of laws and regulations of the Republic of Latvia and RTA affecting the interests of students.		RTA Student Self-Government Regulations

RTA QMS defines RTA policy for dealing with students' complaints. RTA QMS requires person in charge to record complaints, feedback, suggestions, incidents and risks, and to inform about it the staff and the process supervisor and to solve them within his/her competence and authority, that helps to manage and strengthen relationship with students, coordinate actions, solve problems and complaints, and get regular feedback. Student satisfaction is measured and results are used to make improvements.

The Whistleblowing Law came into effect in Latvia in 2019. Following this law, an internal whistleblowing system (Latvian only) has been created for RTA, which is available on the RTA website. A whistleblower (including the student) is entitled to blow the whistle especially on the following violations: failure to act and negligence of officials, or abuse of the official position by them, corruption, fraud, environmental safety threat, labour safety threat, infringement of human rights etc.

During the implementation of the study field "Information Technology, Computer Hardware,

Electronics, Telecommunications, Computer Management, and Computer Science" there have been no cases when complaints have been made. There have been no written appeals against the assessments in the qualification papers. There have been no applications for assessment in a particular study course. There have been no complaints from students. There have been student proposals related to the inclusion of topics relevant to students' interests in the content of study courses, such as design methods, expanding their range, newer technologies, involving students in research grant projects.

In 2021, the RTA Students 'Self-Government created a trust e-mail, on which students can write their complaints, objections and proposals, which are resolved by the head of the academic self-government of the students' self-government in cooperation with the Vice-Rector for Studies and Sciences.

2.2.4. Provide information on the mechanism for collecting the statistical data, as developed by the higher education institution/ college. Specify the type of data to be collected, the regularity of collection, and the way the information is used to improve the study field. Describe the mechanism for obtaining and providing feedback, including with regard to the work with the students, graduates, and employers.

Quality Management System (QMS) of RTA defines the information and knowledge required for strategic and operative actions, providing that the information must be reliable and easily accessible to the relevant persons. The QMS prescribes that RTA collects and manages necessary data in the information systems. The data are analysed, reports for the access of relevant user groups are prepared and published, employees and external users are provided with access to the necessary information, ensuring their security and protection of intellectual property. RTA regularly summarises data related to the study process and scientific activity, submits them to the external data managers according to the national procedures, or uses the data for improvement of the study process (see Table 2.2.4.1). RTA collects internal statistics in order to ensure more efficient programme management, evaluate the quality of study programmes, obtain feedback and recommendations from internal and external evaluators for improvement of the quality of a study programme.

Table 2.2.4.1

Areas of statistical data created by RTA

Information for the third parties:	Internal statistics (every semester / academic year):

● the Central Statistical Bureau – study fields, study programmes, number of students, admission results, distribution of students in accordance to different criteria, academic staff, budget, etc. ● the Ministry of Education and Science – studies in state-funded study places, coefficients of competition, tuition fees, graduates, etc. ● U-Multirank – information according to programme groups, on-demand. ● VIIA – Erasmus + mobility statistics.	• Records of students' attendance of classes on the RTA e-course website https://ekursi.rta.lv/ • The data requested by RTA from the State Employment Agency on RTA graduates registered as unemployed • Qualification of the academic staff (with a PhD degree, elected staff). • Records of plagiarism risk by faculties and study fields. • Data obtained from surveys of students, graduates and employers.

For the improvement of the study field, the own information collected by RTA is used. **Data on class attendance by students** are used for regular monitoring of the student count. This is especially important in groups of foreign students, where class attendance is an important condition for the legitimacy of their residence permit. From 1 September 2019, the attendance is registered electronically on the RTA e-course website https://ekursi.rta.lv/. The specialist of the study process checks lecture attendance every month. In cases when it is discovered that a student has not attended classes for more than a month, the specialist of the study process contacts the student to find out the reasons for his/her absence. If the reason is justified, the respective solutions are sought, for the student to be able to acquire the amount of the missed studies and pass the missed formative testing.

Every year, RTA requests data from the State Employment Agency on RTA graduates who are registered as **unemployed** persons. RTA also analyses the graduate monitoring data collected by the MES, which are available on the MES home page: Studies in the thematic group of natural sciences (https://www.izm.gov.lv/lv/media/11022/download?attachment) (only in Latvian), brief description of college and bachelor graduates (https://www.izm.gov.lv/lv/media/2116/download)(only in Latvian) and a brief description of doctoral and master's degree graduates (https://www.izm.gov.lv/lv/media/2113/download)(only in Latvian). The data of the Ministry of Education and Science show that the employment of RTA bachelor's and college graduates exceeds 80%, and employment in higher qualification professions also exceeds 65%.

Statistical indices of the academic staff are also important for the quality of the study process. The most important of them are the elected and unelected academic proportion in the study programme as well as the proportion of academic staff of RTA having a PhD degree – generally and in the study field, especially in academic and doctoral study programmes.

There are mechanisms to obtain feedback while working with students, graduates and employers. According to the procedures specified in the annual self-assessment procedure of the study fields and the corresponding study programmes of RTA and approved by the Study Council, there are organised surveys of students, graduates and employers to ensure feedback. Information acquisition mechanisms:

- From students: anonymous questionnaires at the end of each semester; individual conversations with the director of a study programme;
- From graduates: firstly, sending centralised electronic questionnaires, which are later summarised by the Department of Studies and evaluated by the SF Council.

- From employers: the latest developments, vacancies, opportunities of traineeships and development of theses in the company, shortcomings in the training of specialists, and other issues are discussed during every meeting with them in the company, RTA premises, seminars, public events or non-formal events in the industry. An open, honest conversation between the programme director and an entrepreneur allows to understand the wishes of the companies in the field of specialist training and shortcomings in the study programme. Such personal contacts facilitate cooperation between RTA and the company, allow to solve many problems related to the study process much easier and faster.

RTA monitors so that the respondents receive summarised feedback on the results of the surveys. Department of Studies of RTA prepares informative announcements about centralised surveys publishing them on RTA home page or sending to respondents.

See the information about the outcomes of the surveys in Annex 8.

2.2.5. Specify the websites (e.g., the homepage) on which the information on the study field and the relevant study programmes is published (in all languages in which the study programmes are implemented) by indicating the persons responsible for the compliance of the information available on the website with the information published in the official registers (State Education Information System (VIIS), E-platform).

Information about the study direction and the corresponding study programs is available on the RTA website and the LAIS system (see Table 2.2.5.1)

Table 2.2.5.1

Information about the study field and programmes of the study field

Information	Website	Type of access	Responsible
Study programmes implemented by RTA	Programming Engineer. https://rta.lv/study-programms/engineer-of-programming Information Systems of Electronic Commerce. https://rta.lv/study-programms/information-systems-of-electronic-commerce Sociotehnical Systems modelling. https://rta.lv/study-programms/modelling-of-socio-technical-systems	free access	Public Relations department Lolita.Kivleniece-Kuznecova@rta.lv
Study Programme Register of RTA , study plans	LAIS: https://luis.lu.lv/pls/lu/stud.menu?l=1&mn=K	Authorized users	The Chief specialist of the study process of the Department of Studies of RTA Iveta.Volkova@rta.lv
ECTS catalogue of study programmes corresponding to SF	RTA home page: ENG-https://www.rta.lv/uploads/source/content_LV/sadarbiba/%C4%80SD/ErasmusPlus/ECTS_catalogue_2021-2022.pdf	free access	External Relations Coordinator Sanda.Kaulina@rta.lv
State Education Information System: information about academic personnel, students, and diplomas issued from 2017.	https://www.viis.gov.lv/	Responsible Staff	Head of Sudy Department Iveta.Volkova@rta.lv Head of Staff Department Inga.Lesnicija@rta.lv
RTA e-courses platform	https://ekursi.rta.lv/		Technical support and consultations: Mihails.Kijasko@rta.lv Course creation and administration: Marite.Mezare@rta.lv

2.3. Resources and Provision of the Study Field

2.3.1. Provide information on the system developed by the higher education institution/ college for determining and redistribution of the financial resources required for the implementation of the study field and the relevant study programmes. Provide data on the available funding for the scientific research and/or artistic creation activities, its sources and its use for the development of the study field.

To ensure the study process successfully, Rezekne Academy of Technologies uses both state budget grants and private funds. Since the establishment of the higher education institution in 1993, the financial position is assessed as stable. Revenue consists of:

- a grant from general revenue,
- tuition fees for higher education,
- funding of the EU structural funds,
- participation fees in seminars, conferences, courses,
- student hostel services,
- other operating income.

Expenditures are planned in proportion to the revenue in the budget. The main items of expenditure are:

- employee remuneration,
- maintenance expenditure and utility bill payments,
- material expenditure of the study process,
- purchase of new equipment,
- reconstruction and repairs of premises.

When planning the expenditure of study fields, the respective amount of funding from the state budget is allocated for the implementation of study programmes, as well as a percentage of the forecasted income of the study programme (tuition fees and other payments related to the study process) is provided. Thus, a stable quality of study programmes is ensured.

See Table 2.3.1.1 for the annual financial provision for study programmes of RTA in the study field Informācijas tehnoloģijas, datortehnika, elektronika, telekomunikācijas, datorvadība un datorzinātne. The total funding consists of both the state budget funding and RTA's own revenues.

Table 2.3.1.1

Funding of the Study Field "Informācijas tehnoloģijas, datortehnika, elektronika, telekomunikācijas, datorvadība un datorzinātneg"

Type of financing	Study year and amount of funding in EUR 2017	2018

2019

2020

2021

2022

State budget funding (excluding funding for scholarships)

287352 320508 333796 355856 391226 401007
Own revenues – tuition fees of the SF’s students

6420 8218 10765 13913 16512 12850
Total funding

392772 328726 344561 369769 407738 413857
See Table 2.3.1.2 for funding for the study programmes implemented in the SF (excluding study programmes intended for closure).

Table 2.3.1.2

Funding for implementation of the study programmes

study programme	Study year and amount of funding in EUR					
	2017	2018	2019	2020	2021	2022
Programming and computer network administration	40575	63507	87941	88301	95713	97584
Programming engineer	178079	185816	170997	171696	186108	200589
Electronic commerce information systems	29692	31014	53731	75538	93150	94398
Modelling of Sociotechnical Systems	19301	20183	20999	21089	22647	22803

According to the RTA Senate 28.04.2020. approved regulations "RULES ON THE PRINCIPLES OF ALLOCATION OF SCIENTIFIC FUNDING AT Rēzekne ACADEMY OF TECHNOLOGY (RTA)" funding of the science base and funding of scientific activity (performance) is not divided by study fields, but in

accordance with the decision of the Senatet directed to the provision of the scientific activity of RTA (remuneration of scientific staff, business trip expenses, grant financing, database subscription, capital expenditures) and scientific institutes, in which the academic staff employed in science represents different study fields. See Table 2.3.1.3 for the yearly breakdown of funding for science base and funding for research activities (performance).

Table 2.3.1.3

Funding to ensure research (creative) activity of the academic staff of RTA

Funding	2017 EUR	2018 EUR	2019 EUR	2020 EUR	2021 EUR	2022 EUR
Funding of the science base	194 774	209 367	190 347	191 094	151 788	218106
Funding of national research programmes	77 401	87 065	91 916	326 952	188754	189926
Performance funding	39 843	138 087	104 009	80 480	29 569	32746
Other revenue from the state budget	10 000	-	-	-	-	
EU structural funds	786 571	1 143 562	347 690	90 712	184 820	1301178
Revenue from contract work with legal persons of the Republic of Latvia	14 841	21 536	12 182	28 488	17 217	8279
Total funding	1 123 430	1 599 617	746 144	717 726	572 148	1750235

The funding for the acquisition of RTA's library collections (see Table 2.3.1.4) is not divided by study fields, because often students of several study fields use the library resources within the study process. There is a cyclical update of the most important literature within each course, but the most relevant additional literature items are updated regularly.

Table 2.3.1.4

Funding for the acquisition of RTA's library collections

Expenditure on acquisition of library collections	2017 EUR	2018 EUR	2019 EUR	2020 EUR	2021 EUR	2022 EUR

Periodic expenditure	2 940	3 009	3 333	3 369	2918	3055
Books	12 102	8 206	7 419	12 407	6891	5499
Electronic documents and databases	19 184	15 828	7 086	2 930	5424	5623
Total:	34 226	27 043	17 838	18 706	15233	14177

Funding for the Students' Self-government is provided annually in the amount of at least one two hundredth of the state funding for the study process and tuition fee revenues and fluctuates around twelve thousand EUR a year (see Table 2.3.1.5).

Table 2.3.1.5

Funding for Students’ Self-government

Funding	2017 EUR	2018 EUR	2019 EUR	2020 EUR	2021 EUR	2022 EUR
Funding for Students’ Self-government	12 422	12 729	12 331	12 918	14399	13653
State budget funding for the study process	2 001 323	2 076 881	2 162 918	2 242 195	2492457	2397498
Tuition fee revenue	482 993	468 832	303 241	341 409	375370	333157
Total revenues from the study process	2 484 316	2 545 713	2 466 159	2,583 604	2867827	2730655
Students’ Self-government funding proportion,%	0.5	0.5	0.5	0.5	0.5	0.5

2.3.2. Provide information on the infrastructure and the material and technical provisions required for the implementation of the study field and the relevant study programmes. Specify whether the required provision is available to the higher education institution/ college, available to the students, and the teaching staff.

The infrastructure and material and technical base of the Faculty of Engineering of RTA fully ensures successful implementation of all the study programmes of the study field. The total value of laboratory equipment, computer equipment, presentation equipment and software available for the study field is approximately 4 million EUR. For full information on the infrastructure, software and laboratory base with the most important equipment available to the SF see the Annex.

The infrastructure of the Faculty of Engineering consists of: 1) Engineering faculty building (put into operation in 2014) with laboratories, workshops, lecture rooms, staff and student premises; 2) Information Technology Centre (computer rooms, electronic publications room, computer equipment service room, server room); 3) Laser Technology Centre (put into operation in 2019). In addition, the main building of RTA is used for the acquisition of study courses in social sciences and humanities.

Information on laboratories of the SF, their area and total value of equipment is given in Table 2.3.2.1.

2.3.2.1.tabula

Laboratory base

No.	Laboratory	Total value, EUR	Area of the premises, m2
1.	Physics laboratory	120’000	102
2.	Laboratory of electrical engineering, electronics and electric actuators	215’000	130
3.	Laboratory for research of mechanical properties of materials	470’000	97
4.	Mechatronics laboratory	347’000	75
5.	Laboratory of fluid mechanics and hydraulics	95’000	57
6.	Laser Technology Centre	274’000	323
7.	Laboratorium for datanettverk og datateknikk Cisko		

The equipment of all laboratories/workshops is freely available to every student, lecturer and researcher on working days from 7:30 to 19:30, at weekends from 7:30 to 17:30. 9 engineers and 5 laboratory assistants are involved in work with the expensive and specific laboratory equipment. They help students to carry out scientific research, develop and manufacture equipment prototypes

in laboratories and workshops, as well as provide quality consultations on the development of course projects and diploma projects. This staff provides support to lecturers during classes, and to researchers during their research, development, production and approbation of experimental test benches and prototypes. The Department of Information and Communication Technologies ensures administration and normal functioning of computer systems and computer networks of RTA; it has 7 employees (2 administrators of computer systems and computer network, 2 programming engineers, 1 programming technician, 1 computer system technician, 1 computer technician). The available software can be used freely by any student, lecturer or researcher. The equipment and facilities of all laboratories/workshops are the property of RTA. All buildings (study, laboratory, household), student dormitories and land (4.2 ha), on which they all are located, are the property of RTA.

Information on the lecture rooms available to the SF, their area and number of work places is given in Table 2.3.2.2. The premises of some laboratories are also simultaneously used as lecture rooms.

Table 2.3.2.2

Provision of Faculty of Engineering of RTA with lecture rooms

No.	Lecture room	Area, m2	Number of places
1.	Lecture room No. 105	158	96
2.	Lecture room No. 111	95	60
3.	Lecture room No. 112	61	30
4.	Lecture room No. 113 (Laboratory of fluid mechanics and hydraulics)	57	16
5.	130.auditorija	63	30
6.	Computer room No. 118 (CAD/CAE/CAM laboratory)	70	10
7.	Lecture room No. 132	70	30
8.	Lecture room No. 013	94	60
9.	Lecture room No. 015 (Laboratory of electrical engineering, electronics and electric actuators)	130	36
10.	Lecture room No. 308 / conference and presentation hall	106	50
11.	Lecture room No. 102	64	30
12.	Computer room No. 201	44	10
13.	Computer room No. 203	109	20
14.	Computer room No. 204	99	20

All the lecture rooms are equipped with interactive whiteboards or multimedia projectors. The total number of computers at the faculty (excluding library) that students can use in the study process is approximately 100 and most of them are connected to the internet. Given that the total number of students at the Faculty of Engineering (including part-time students) is about 500, it can be concluded that the number and area of the existing laboratory and lecture room premises, the number of workplaces, computers and presentation equipment in the faculty fully meet the needs of the study process. Wi-Fi is freely available everywhere. All rooms are accessible for the persons with disabilities.

2.3.3. Provide information on the system and procedures for the improvement and purchase of the methodological and informative provision. Description and assessment of the availability of the library and the databases to the students (including in digital environment) and their compliance with the needs of the study field by specifying whether the opening times of the library are appropriate for the students, as well as the number/ area of the premises, their suitability for individual studies and research work, the services provided by the library, the available literature for the implementation of the study field, the databases available for the students in the respective field, the statistical data on their use, the procedures for the replenishment of the library stock, as well as the procedures and possibilities for the subscription to the databases.

The RTA library has been located in the Faculty of Engineering building since 2014. The library offers its users comfortable facilities – the reading room, borrowing, rooms suitable for individual work – for independent studies and research. The total area of the library is 459 m^2, which provides 30 workspaces for the users.

The library collection corresponds to RTA study programmes and fields. The total size of the collection is 55712 copies. The latest literature in the corresponding spheres is acquired on a regular basis; the majority of the funding intended for such acquisition is used for specialised literature in the English language. In accordance with the Procedures for the Acquisition of Literature, literature request lists are submitted to the library on a regular basis. To make the requesting process easier and faster, a special Library Collection Expansion Form has been created, which is available in an electronic form in the RTA document management system. Books purchased or issued as part of projects make a significant contribution to the collection. Database subscription is decided on during RTA Scientific Council meetings after getting acquainted with the Database subscription price offers and the usage statistics from previous periods. Inter-library loan services are available to the library users.

In the academic year 2022/2023, the library offered its users the following databases: iFinanses, iTiesības, iBizness, Latvijas Standartu bibliotēka, BilancePLZ, Jurista Vārds, Skolas Vārds, EBSCO, ScienceDirect, Scopus, Web of Science, ASTM Compass Abstracts, Digital collections of LNB. Database trial subscriptions are also offered, for example in academic year 2021/2022 there were 6. Databases can also be used remotely. In 2021, database usage was 33772 sessions. To enable students to learn about the RTA library e-resources, their use and availability, the library offers classes and individual consultations. The library offers testing the e-resources of different foreign publishers on a regular basis.

In the RTA library's electronic catalogue, it is possible to select literature in the sphere of interest. For the users' comfort, the library website has the e-resources section, which contains the summary

of links which provide access to databases, scientific articles of RTA and other higher education institutions, open-access resources, and e-books.

The RTA library uses the Latvian Library Information System ALISE for keeping record of its collection, which ensures remote access to the library catalogues and a variety of options to search for information, as well as ordering /reserving items for authorised users. The library e-catalogue website allows logging into the Unified Catalogue of Higher Education Institutions and Special Libraries(information in Latvian), the Unified Catalogue of the Rēzekne Region(information in Latvian), the National Unified Catalogue, which allow searching for and ordering the necessary resources, which is possible using the interlibrary loan option.

The library is open on business days from 9:00 until 17:00. Every year, following the proposal of master's / part-time students or the management of the study fields, the library also serves readers on Saturdays; however, these hours are not regular but adapted to current demand and return to normal working hours when the actual demand subsides.

See the SF book supply in Table 2.3.3.1.

Table 2.3.3.1

Study field's book supply on 01.12.2022.

UDK index, field	Number of copies	Number of titles
008 Civilization. Culture. Progress	591	231
004 Computer science and technology. Computing. Data processing	2216	522
62 Engineering. Technology in general	1914	650
681 Automatic control technology. Smart technology	138	39
51 Mathematics	3120	507
53 Physics	733	197
621.3 Electrical engineering	435	169

The book collection is expanded on a regular basis; information on the most recently acquired books can be found on the RTA home page.

RTA is persistently working on ensuring unrestricted access for students to the broadest information possible about the study process and content. The most significant information sources available to students at RTA include:

1. Latvian Higher Education Institution Electronic Information System (LAIS), which contains the following information available to students: descriptions of study courses, study plans, class schedules, any changes in them, students' grades, information about orders related to the study process (matriculation, exmatriculation, scholarships, etc.). The LAIS environment also has an integrated plagiarism control system where students' final papers are tested.
2. Electronic learning management website in the Moodle system ekursi.rta.lv, which provides access to study course programmes, learning outcome evaluation requirements, lists of

recommended literature, study course learning materials. The system is improved every year.

3. The scientific journal and article collection website jornals.rta.lv, where RTA conference article collections and journals are uploaded with open access.
4. The materials of the annual RTA international scientific conference "Environment. Technologies. Resources", which are available with open access at the website *journals.rta.lv.*
5. The library of books newly published by RTA and available electronically at *books.rta.lv*.

2.3.4. Provide a description and assessment of information and communication technology solutions used in the study process (e.g., MOODLE). If the study programmes within the study field are implemented in distance learning, the tools specially adapted for this form of study must also be indicated.

In the study process, RTA uses the Moodle system. Regulation on the RTA Lecturer stipulates that each study course the lecturer designs a description of the study course in accordance with the provisions approved at the RTA Study Council "Provisions on Designing Study Course / Module Descriptions at RTA", study course materials, which cover the theoretical material of the study course, student self-examination tasks, independent work tasks, and learning outcome evaluation criteria/materials. The lecturer uploads study course materials to the study course website ekursi.rta.lv, following the Methodological Recommendations for the Creation and Maintenance of the Study Course Content on the Website ekursi.rta.lv approved by the RTA Study Council, which include a prepared study course template, including survey forms, which the member of teaching staff can use for obtaining feedback at the end the study course, which helps the teaching staff to create study courses in *Moodle*. In accordance with the RTA Rector's order, student attendance is also recorded in Moodle.

In the circumstances of remote studies, to implement contact hours (lectures, practical classes, incl. laboratory works, if these can be implemented remotely, consultations, discussion clubs, forums, etc.) and virtual mobilities, RTA uses communication tools *Ms Teams* or *Google Meet* (if *Microsoft Teams* is unavailable). RTA has designed methodological recommendations for the teaching staff and students for work in the *Ms Teams* environment. If necessary or upon individual request, RTA provides trainings, individual consultations, or technical support for work in the *Moodle* or *Ms Teams* environment. Ms Teams platform is widely used for remote study course management, including the implementation of hybrid classes (where some students are present in the classroom and others are studying remotely from home), for videorecording of classes, and providing all types of consultations. In the circumstances of the Covid-19 crisis, it was also used for the defence of traineeships/ study projects/ diploma papers. Interactive whiteboards are widely used in conjunction with *Ms Teams* (for example, practical classes, task performance, and remote consultations); any issues that are not clear to the students are explained on the board, and at the end of the class the data are saved in the PDF format and uploaded to the *Ms Teams* platform, where they are freely accessible to the students.

To learn about the needs of the teaching staff when working with the communication platforms determined by RTA, RTA conducts surveys encouraging the teaching staff to express their suggestions regarding the required support measures. Overall, 20 members of teaching staff responded to the survey conducted in September 2021. 12 respondents said that additional training and consultations were not required, thus appreciating the methodological materials and instructions prepared; 8 respondents were provided with individual consultations or technical

support for work with the *Microsoft Teams* environment. Regarding work in the *Moodle* environment, no requests have been made for a seminar or an individual consultation.

In the spring of 2022, a survey of RTA students on the use of information systems was conducted, in which 94 respondents participated. The survey showed that the least used sites were the RTA's DVS system and the website, which was under conversion. In order to make these sites more user-friendly, a number of measures were taken to organize their content and interface.

In December 2022, a survey of RTA employees was organized regarding the necessary support in the use of information systems. 36% of the teaching staff indicated that they would like to improve their competence by working on the e-course website, while choosing individual consultation with the responsible employee (26%) or video online training (34%) as the most suitable for them.

The use of ICT developed especially extensively during the Covid-19 crisis, when each docent had to teach classes remotely, provide students with methodological learning materials and independent work tasks, implement consultations and test the students' knowledge remotely.

The LAIS system is accessible to students and docents via a username and password; it contains all the information regarding the study process: evaluation and credits for the courses acquired, class schedule, study course programmes; it enables registration for elective courses, registration with study project, diploma project, and traineeship supervisors, etc.

2.3.5. Provide information on the procedures for attracting and/or employing the teaching staff (including the call for vacancies, employment, election procedure, etc.), and the assessment of their transparency.

RTA academic staff planning issues are regulated by the RTA Activity and Development Strategy 2016–2023, and the RTA Academic Staff Development Measure Plan 2018–2023. Other issues related to the planning of the academic staff of the RTA are regulated by Regulation on the RTA Lecturer, Rules for Planning, Accounting, Control and Payment of Teaching Methodological Developments and Scientific Research (Only in Lavian), Procedures of Planning and Accounting of the Amount of Work of RTA Academic Staff, Procedures of Evaluation of the Quality of Work of Academic Staff of the RTA (Only in Lavian), and other documents. The most important criteria for the selection of academic staff are scientific and professional competence.

RTA assistants, lecturers and docents are elected for six years in accordance with the requirements of the Law on Higher Education Institutions. Professors and associate professors are elected for the first time for a term of six years, providing for the conversion of a fixed-term contract into an open-ended contract after evaluation of compliance for the position within the term set by RTA. All job advertisements for vacancies of academic staff are announced in an open competition, published in the Official Gazette "Latvijas Vēstnesis" and other reference media. Applicants' compliance with the announced vacancy is assessed in accordance with the Regulations on Academic Positions at RTA. RTA publishes advertisements on the Euraxes portal to attract foreign teachers.

An important direction of professional development of the academic staff is doctoral studies. The study field purposefully plans development of the academic staff, including promoting the strongest graduates of the master's programme to continue their studies in doctoral studies. Two of the teaching staff employed in the study programm, have obtained a doctorate in the RTA doctoral programme "Modeling of sociotecnical systems" (S.Kodors, I.Zarembo).

2.3.6. Specify whether there are common procedures for ensuring the qualification of the academic staff members and the work quality in place and provide the respective assessment thereof. Specify the options for all teaching staff members to improve their qualifications (including the information on the involvement of the teaching staff in different activities, the incentives for their involvement, etc.). Provide the respective examples and specify the way the added value of the possibilities used for the implementation of the study process and the improvement of the study quality is evaluated.

RTA quality management policy determines quality principles, including:

- Staff involvement and development – employees have a similar value system, mutual trust and a sense of responsibility. RTA invests resources in the professional development of employees and stimulates them to become more involved in the operation and development of the institution. RTA assesses the professional competence of employees and compliance with satisfactory execution of duties, supports and motivates the improvement of professional qualification, career development, provides social guarantees. RTA promotes employee cohesion and the creation of a unified corporate culture.
- Continuous learning and improvement - introduction and utilization of new, innovative technologies, mutual exchange of knowledge, introduction of innovations and improvements. Employees are introduced and trained to work with new and innovative technologies, which are used at work and increase the competitiveness of RTA.

The academic staff development guidelines of RTA define the main processes related to the development of the academic staff:

- Student-centred study process;
- A research process focused on public demand for the creation of innovative products and services;
- A communicative process involving the exchange of knowledge and innovation at inter-university level, effective international academic and research cooperation;
- A technological process aimed at the availability of high-quality, science-based higher education, introduction of new modern technologies in the study and research process.

The qualification assessment of the teaching staff of the study field takes place in several stages: the compliance with the formal requirements of the specific position is assessed when concluding an employment contract; student surveys on the competence and professionalism of the teaching staff are organised during the study process. In all cases, compiled feedback information on the results of the surveys is prepared and sent to both students and teaching staff.

Academic staff of a SF is selected to implement the aims of the study programmes and achieve the set study results. Both elected lecturers and guest lecturers are employed for a SF. Lecturers-practitioners with extensive professional work experience in the field are involved in the implementation of study field programmes:

- doc. I.Zarembo - sistēmanalītiķis, datordizaineris, IT projektu vadītājs; valdes loceklis SIA “Soaphog"; darba stāžs nozarē - 17 gadi;
- Prof. L.Litavniece- 7 years of experience in the banking sector; 5 years - RTA project department manager; owner and manager of the company SIA Safīra L (food processing), member of the Council of Rezekne Association of Entrepreneurs, member of the Latgale Regional Council of the Latvian Chamber of Commerce and Industry, member of the

Knowledge Economic Council of the Latvian Chamber of Commerce and Industry.

- Lecturer M.Kijaško - 20 years of professional work experience in the IT industry.
- Professor A. Teilāns - the total work experience in the IT sector is 25 years; from 1992 to the present: employed as a programmer, systems analyst, senior project manager and head of academic cooperation at A/S Exigen Services Latvia (previously named as SWH RIGA, SIS and Data).
- guest lecturer N. Pušņakovs (Chairman of the Board of SIA Midis), V. Dubovskis (former Co-Founder & CTO at Microlines, active creator of IT knowledge exchange) etc.

Attracting professionals from the industry facilitates students' interest in studies and significantly improves the quality of studies. For full information on the length of professional service and experience of lecturers in the field, see Annex 14 and their CV in Annex 10.

The qualification of the teaching staff of RTA is assessed and increased in several ways:

- Once in the election period, the elected academic staff must complete a professional development programme *University Didactics* or *Innovations in Higher Education* in the amount of 160 hours. The programme also offers courses for personal development, scientific writing, other topical issues of higher education: student-centred approach, quality management, etc.
- All teaching staff has an opportunity to apply for an evaluation of the quality of work carried out by the academic staff (this is a voluntary measure), which provides for the determination of the quality coefficient, which is applied to the next year's salary. Starting from 2018, the indicators of the work quality of the teaching staff have been aligned with the principles of the student-centred approach, evaluating the contribution of the teaching staff to the increase of the student's academic, scientific and professional competence.
- Within the framework of the RTA project No. 8.2.2.0/18/A/0168: “Strengthening of RTA academic staff in the study field “Mechanics and metal working, heat power industry, heat engineering and mechanical engineering” and “Management, administration and real estate management”, the lecturers involved in the study field can increased their English language skills, acquire digital skills and leadership competencies, as well as carry out internships for up to 200 hours, thus improving the professional competencies corresponding to their field, which will later be approbated and introduced in study courses.
- The involvement of lecturers and students in projects increases the professional qualification of the project participants and promotes the development of the study process (see examples in Chapter 2.4.2). In projects, students and lecturers learn to work in a team, new products are developed and prototypes are made together, and issues related to the commercialisation of these products are addressed. All this motivates students and lecturers to think about starting their own businesses. Working on projects also provides additional competitive salary. In turn, in order to get involved in projects, both lecturers and students need appropriate professional competence.
- The new knowledge and skills, which can be acquired as well as professional competencies and opportunities that increase salary motivate lecturers to participate in these events.

  Indicators have been developed to assess the added value of the opportunities used (for implementation of the study process and for quality of studies), the most important of them are:

  1) dynamics of the number of students;

  2) number of foreign students;

  3) employment of graduates;

4) the number of companies established by graduates;

5) matriculation competition coefficient;

6) the amount of attracted financial resources;

7) the percentage of the academic staff with a doctoral degree;

8) scientific qualification of the academic staff;

9) the number of defended doctoral theses;

10) the number of patents obtained and licenses sold.

2.3.7. Provide information on the number of the teaching staff members involved in the implementation of the relevant study programmes of the study field, as well as the analysis and assessment of the academic, administrative (if applicable) and research workload.

44 lecturers are involved in the implementation of the study programmes of the SF. Of them, 27 (59%) lecturers are elected to the RTA academic or scientific positions, 17 (39%)- are non-elected to the RTA. 7 of the unelected academic staff are faculty members from ViA and RTU involved in the joint doctoral study programme "Modelling of Sociotechnical Systems". 24 (55%) lecturers have a doctoral degree; 16 (or 67%) of them are RTA elected.

Distribution of RTA elected lecturers by positions:

- Professors- 6 (including, RTA-elected leading researchers- 4);
- Assoc. Professors- 5 (including, RTA-elected leading researchers- 4, researcher- 1);
- Docents – 3 (including, RTA-elected leading researchers- 2);
- Lecturers -9 (including, RTA-elected scientific assitants, researchers- 6);
- Researchers - 2.

Distribution of RTA guest lecturers by positions:

- Guest Lectors -8 including, RTA-elected scientific assistant- 1)
- Guest Docents – 1.

For full information about SF lecturers, see Annex 9. and for the lecturers' CVs – Annex 10. For the certification of SF lecturers' official language knowledge, see Annex 11, for the certification of SF lecturers' English language knowledge – Annex 12.

The regulations on types and amount of academic workload of the teaching staff, work planning, accounting and control procedures are regulated by the Procedures for Planning and Accounting of Work Amount of Academic Staff at RTA for the current academic year. The RTA procedures are developed according to the Cabinet of Regulation No. 445 Regulations Regarding Remuneration of Teachers and provide for a full-time workload of 900 hours per year for a professor and an associate professor, 950 hours per year for a docent with a doctoral degree, and 1000 hours per year for a docent without a doctoral degree, a lecturer, and assistant. The academic workload consists of teaching staff’s work in the lecture room, consulting students, supervision of study research and evaluation of learning outcomes.

Scientific work is a mandatory part of the academic staff’s work. It may be performed working as a

scientist (leading researcher, researcher or scientific assistant), scientific technical personnel or scientific service personnel. The academic staff elected to the scientific position performs scientific work in accordance with the RTA Provisions for Planning, Accounting, Controlling and Paying the Workload of Scientific Work. The workload of the scientific work consists of scientific projects / contract work, scientific publications, study research (if the scientific staff is studying for a master's or doctoral degree) as well as expertise, evaluation and review of scientific work, assembly of scientific articles and material collections, scientific editing, etc. A scientist may be concurrently elected also to the academic position of a professor, associate professor, docent, lecturer or assistant. RTA ensures that the total annual workload of the academic staff does not exceed the amount of hours specified in the Labour Law.

RTA full-time academic staff works a 40-hour week. In accordance with the Senate’s approved Procedures for Planning and Accounting of Work Amount of Academic Staff at RTA, the total annual workload of the academic staff shall not exceed the amount of hours specified in the Labour Law.

The academic workload of SF staff, similarly as in RTA altogether, prevails over the amount of scientific work. It is determined by two aspects:

- in accordance with Latvian laws and regulations, the monthly base remuneration for one unit of scientific staff complies with 50 % of the lowest rate of the monthly salary of a professor, and it is a poor motivation for the teaching staff to participate in scientific research work actively;
- scientific activity is combined not only with the pedagogical workload, but also with professional activity in the field or administrative duties at RTA, which limits scientists' ability to participate in large-scale research projects.

2.3.8. Assessment of the support available for the students, including the support provided during the study process, as well as career and psychological support by specifying the support to be provided to specific student groups (for instance, students from abroad, part-time students, distance-learning students, students with special needs, etc.).

In order to ensure a successful higher education environment, RTA provides both physical resources (laboratories, workshops, libraries and IT infrastructure) and human resources (teaching staff, study consultants, engineers, and laboratory assistants). To support students otherwise than by means of structural units of Administration (Dean's offices, Department of Studies, Department of Science and Project Managament, External Relations Department, etc.), RTA offers:

- individual services of a psychologist concerning such psychological issues as organisation of personal studies, mutual relationships and other issues related to studies and communication in the study process. RTA offers individual and group classes. Communication, relationship building, skills and self-image improvement group classes – trainings are available. A practicing psychologist offers its services. Consultations are free for RTA students;
- individual career counselling services thus helping students to identify their interests, skills, abilities and values, deepen understanding of the career choice, professional suitability; inquire about the peculiarities of personality and the profession; to obtain topical information regarding career issues; receive support for successful career planning; to ascertain the choice of the right profession for oneself. In regards to the career choice, RTA offers individual and group classes delivered by a certified career counsellor. Consultations are free

for RTA students; In addition to individual career counselling, RTA provides an RTA Career Portal(Only in latvian), where information on traineeship, work and volunteering opportunities is regularly published;

- an opportunity to create an individual study plan for independent learning supported by RTA on conditions when due to work or family circumstances the student is unable to adjust to the general study schedule. This possibility is prescribed by the RTA Student Rules and Regulations.

Each lecturer provides official consultations once a week, when students can receive help with uncomprehended questions from the study courses delivered by the lecturer.

RTA always follows the principle which implies that the most important person of the higher education institution is the student; all aspects of the work process shall be organised in such a way that is convenient and comfortable for the student. All employees of RTA follow this principle. Considering that the number of students is relatively small, every student of the Faculty of Engineering has an opportunity (without making a prior appointment, almost at any time when the employee is not busy in classes or meetings) to receive consultations from laboratory technicians, engineers, lecturers and administrative staff on issues concerning the studies and scientific activities of the student, as well as the use of laboratory / workshop's machinery and equipment, etc.

All buildings of RTA are adapted to needs of students with reduced mobility. In order to inform the teaching staff about the impact of disability on the study process, in 2021, MIC of RTA organizes a cycle of professional development classes Disability Awareness and Communication in Education, thus exploring such themes as disability awareness and experience, communicating with and about people with disabilities, disability – lectures and classes, why it is useful for academic staff to include diversity and disability in classes and lectures, and other issues of interest to students and teaching staff.

In 2020 and 2021, the main attention is paid to support of students in conditions of remote studies, organising informative and consultative measures for work in the e-environment.

All of these events are also applied to foreign students. The International Office of the RTA is intended to provide support for foreign students.

2.4. Scientific Research and Artistic Creation

2.4.1. Description and assessment of the fields of scientific research and/or artistic creation in the study field, their compliance with the aims of the higher education institution/ college and the study field, and the development level of scientific research and artistic creation (provide a separate description of the role of the doctoral study programmes, if applicable).

As a scientific institution, RTA was registered with the Latvian Register of Scientific Institutions in 2013 (reg. No. 1172165). The aims of scientific activity are determined by the "Strategy of Scientific Activity of RTA 2019–2023"; those are:

- excellence in research, ensuring transfer of innovation and knowledge to business environment and economic development;

- synergy between research and pedagogical work, ensuring the training of high quality competitive specialists;
- popularization of research results and recognition of scientists through international scientific conferences, seminars, discussions and other public activities in the fields of engineering, education and social sciences;
- focusing on research and innovation policy goals defined by the EU – open innovations, open science and openness to the world;
- collaboration between staff, students, alumni and partners of all levels, institutes and fields of activity;
- effective administrative and financial management at all levels, ensuring targeted and efficient use of resources for implementation of high quality studies and excellence-focused research.

Research at the Faculty of Engineering is coordinated by the Institute for Engineering (Only in Latvian) of RTA. The goal of the Institute is to carry out research in the domain of engineering science and technology, perform contract research works in engineering science and associated interdisciplinary domains in order to ensure research and scientific activities, availability of research-based higher education, transfer of knowledge to national economy and cooperation with the production industry to conduce economic growth across Latgale, Latvia and Europe. Areas of activity of the Institute:

- electronics, power electronics, information and communication technologies;
- laser technologies;
- mechanical engineering and mechanics;
- material engineering;
- environmental engineering and power industry;
- other engineering sciences and technologies, including food and beverage technologies.

The scientific subject area of the SF is in line with the fields of concern of the Institute for Engineering. 18 of the teaching staff employed in the direction of studies have also been elected to a scientific position (Leading researcher, researcher or research assistant).

During the reporting period, teaching staff employed in the direction of studies participated in the implementation of 26 research projects. 11 projects have been implemented in the Erasmus+ program in cooperation with other RTA study areas and many EU countries. 2 projects were implemented in the Latvia-Ukraine research project program, 1 - in the project program of the Baltic - German University Office. Two scientific projects were implemented in the FLLP program of the Latvian Science Council in cooperation with the LBTU Institute of Horticulture, 2 - in the State research program in cooperation with other Latvian universities. RTA scientific grant was obtained for the implementation of 4 projects. The results of the projects have a significant impact on the study process, as they involve not only teaching staff, but also students, the solutions developed in the projects are implemented not only in RTA, but also in Latvian and foreign cooperation universities.

Once in every two years, the Faculty of Engineering of RTA hosts an international scientific and practical conference "Environment. Technology. Resources". The 13th conference took place on 17 and 18 June 2021. Having accepted 157 articles, it was attended by scientists from 10 countries (Belarus, Bulgaria, Estonia, Italy, Russia, Latvia, Lithuania, Poland, Germany and Turkey). The collection of articles of the conference is indexed within the SCOPUS database. These articles are freely available at the RTA`s website http://journals.rta.lv/index.php/ETR.

Each year, the RTA Faculty and Engineering holds an international scientific and practical student conference "Human. Environment. Technology." 21 April 2021 was the date of the 25th conference.

The collection of articles of the conference is available at http://journals.rta.lv/index.php/HET.

To strengthen the scientific capacity of RTA, there was developed a joint doctoral study programme Sociotechnical Systems Modelling (RTA, ViA). The Activity and Development Strategy of RTA 2016-2023 determines implementation of full-cycle studies as the priority development objective for the study field, which also includes cooperation with other higher education institutions in terms of developing joint study programmes. The doctoral study programme ensures involvement of wider academic personnel with doctoral degrees, renewal of the RTA`s academic staff, as well as conduces the synergy of studies and research within the study field. This programme facilitates the transfer of knowledge of information technologies to the production industry, promoting the development of Latvian national economy. The programme is implemented through the involvement of leading academic personnel from both education institutions; this conduces the transfer of knowledge to the academic environment.

Cohesion between the study process and research in the domain of public information is further evidenced by active participation of the teaching staff and students in the annual events of the European Researchers' Night.

2.4.2. The relation between scientific research and/or artistic creation and the study process, including the description and assessment of the use of the outcomes in the study process.

One of the core objectives set by the RTA Strategy is the implementation of science-based study process. Scientific research is closely correlated with the study process. Scientific research is addressed by the core study programmes as early as during the first year of studies; the principles are taught within the boundaries of the Principles of Research subject. A mandatory requirement for all study papers, qualification theses and the diploma project is to study the scientific literature sources on the issue in question. Bachelor, master and doctoral study programmes always include scientific research as a prerequisite to obtain a diploma. Study papers done within the boundaries of the programme Programmēšanas inženieris can be deemed a start of the students' scientific and research work, which they continue to develop in their diploma projects. The programme Programmēšanas inženieris is intended to culminate in the defence and publication of an diploma project. Development of a master's thesis in laser technology is a research project (commonly production-related); publication of the results of their research is a mandatory requirement for master's degree students to be granted a diploma. The doctoral programme is based on scientific and research work; a doctoral dissertation cannot be defended without publications in internationally quoted periodicals and journals.

Students are involved in the development of scientific projects.

The annual RTA Research Grant allocates small funding (1’500 to 2’000 EUR) to allow a broader community of students to become involved in scientific research. For example, IT students and staff worked on one of the following projects over the last few years:

- "Robotic Arm for Grabbing Soft and Fragile Objects";
- "Interdisciplinary Research for the Application of Laser Machining (Laser Engraving, Laser Cutting) Technology in Textile Materials";
- "eNose for IoT devices" (2018), etc.

Based on these projects, the students have developed their own term papers, and some went as far

as to produce their diploma projects and Master's Theses.

The teaching staff and students of the study field also cooperat in the performance of research ordered by local institutions and businesses. For example,

- Action programmes: "Growth and Employment", European Regional Development Fund project "Technology Transfer Programme" (project identification number 1.2.1.2/16/I/001) contract No. 9.17/2019-04-1 "On the development of a prototype CO2 laser labelling / cutting machine with automatic surface levelling" 31 January 2019. Voucher No.2 (valid through 04 January 2020, contracting authority: "DKRobotics" LLC).
- Contracts from other Latvian universities (DU, ViA, KuA) for development and maintenance of conference and scientific article systems (2018, 2019, 2022)
  Commissioned studies on remote sensing data processing solutions by public and private institutions (State Forest Service (2017), State Land Service (2020)).
- 2022.gada decembrī noslēgts līgums ar SIA “Vet Health Spektrum” (Rīga) par govju datu digitālas monitoringa sistēmas prototipa izstrādi.

Several students (2 from the programme Mechatronics, 2 from the master's programme Laser Technology, 1 from the master's programme Computer Systems) also participated in the "Continuously variable transmission for micro-mobility vehicles" project of the Investment and Development Agency of Latvia (IDAL) (stages 1 and 2; 2020-2022; Funding at the 1st stage – 24’894 EUR, at the 2nd stage – 302’000 EUR). Within the boundaries of the project, the students work on the development of a new type of drive gear for electric go-carts; having studied the appropriate scientific literature, the students have developed and produced an experimental bench for measuring the mechanical and electrical parameters of go-carts, and now do test drives and measurements on the track, apply improvements to the design, produce parts and units, program the automatic control system. A patent application has been filed in. For students, this project serves as a real-life example of how research is transfused into innovation.

Latvian Council of Science project: lzp-2019/1-0094 Application of deep machine learning and datamining for the study of plant-pathogen interaction: the case of apple and pear scab pathosystems. Project duration: 01.01.2020 - 31.12.2022. Funding 129’747 EUR. Partners: Latvia University of Life Sciences and Technologies, the Institute of Horticulture; RTA. Project tasks: 1) apply semantic analysis and datamining for studying the interaction between plants and pathogens: apple and pear scab pathosystems; 2) develop systems for timely identification of apple and pear scab; 3) develop an IoT system model for apple and pear tree monitoring. The project involves SD staff and students.

Participation of students in scientific research projects also yields a great improvement of the quality of the study process: students face real scientific problems that need to be solved, and develop genuine interest in these; they go through all stages of scientific work – from literature and analogue design research to software, system and technology development.

Students are also encouraged to take part in various competitions. For example, in 2022 a team of students, including SV students, won 1st place in the Baltic Mechanical Engineering Student Competition "Zobrats 2022". Sešiem datorzinātnes studentiem no piecām augstskolām par izciliem studiju noslēguma darbiem pasniegtas «ZIBIT 2017» stipendijas. Konkursu «ZIBIT» rīko AS «Exigen Services Latvia» un AS «Accenture Latvia» sadarbībā ar nodibinājumu «Rīgas Tehniskās universitātes Attīstības fonds». Maģistra darbu kategorijā trešajā vietā ierindojās RTA studente O. Petrova ar darbu «Bitmonētu kriptovalūtas integrēšana Latvijas elektronisko komersantu norēķinu sistēmā». In 2017. RTA student P.Cacivkins saņēma Exigen stipendiju, bet 2018.gadā viņš saņēma prestižo the Charles Babbage Award of the Faculty of Computer Science for his productive work in computer science and its popularisation.

2.4.3. Description and assessment of the international cooperation in the field of scientific research and/or artistic creation by specifying any joint projects, researches, etc. Specify those study programmes, which benefit from this cooperation. Specify the future plans for the development of international cooperation in the field of scientific research and/or artistic creation.

RTA participates in the development and implementation of various scientific projects.

The specificity of the IT field of study is determined by its interdisciplinary nature, which is implemented in a variety of Erasmus+ projects, where one of the components is information technology as a tool for the development and implementation of new innovative information technology tools. In this field, RTA has implemented 11 projects in the reporting period in interfaces such as education, distance learning, construction, engineering, etc. The geography of cooperation covers 18 countries, among which the most frequently involved partners are from Poland, Italy (4 projects each), Bulgaria, Turkey, Ukraine, Germany (3 projects each), Greece, Hungary, Lithuania (2 projects each), etc.

In September 2022, RTA representatives together with colleagues from the University of Latvia, Riga Technical University, Ventspils University College, National Library of Latvia and Kaunas Technical University visited the European Organization for Nuclear Research - CERN (Geneva, Switzerland). During the visit, organisational and technical issues were discussed regarding the establishment of a CERN TIER II computing centre in the Baltics, which will include organisations from Latvia, Lithuania and Estonia. The cooperation will include the development of large computing capacities in the RTA's existing infrastructure. Overall, it will allow the RTA staff to improve their qualifications, improve and develop the RTA's scientific directions, and Masters and PhD students to participate in and attend CERN summer schools and conferences.

To support international science projects, the RTA is implementing the ERDF project "Support to international cooperation projects in research and innovations at Rezekne Academy of Technologies", No. 1.1.1.5/18/I/012. Project duration: 03.09.2018 - 31.12.2022. Funding 113’384 EUR. The aim of the project is to increase the research and innovative capacity of RTA, ensuring the participation of the scientific staff in international research, networking and fellowship events in the European research area and preparing at least five project applications of the programme HORIZON 2020 and the EU Ninth Framework Programme in the priority research areas of RTA, evaluated above the quality threshold. The funds allocate for the project were used to support the participation of teaching staff and researchers of the SF in international conferences, seminars at the project development stage; funding was provided to hold the international scientific conference “Environment. Technologies. Resources" in 2021 and 2023.

RTA together with German partners - Hochschule Mittweida and Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung E.V prepared and submitted the interdisciplinar project application “Latvia Laser Technology Center” for Horizon 2020 programme (Horizon 2020 - Research and Innovation Framework Programme, Call: H2020-WIDESPREAD-04-2017-TeamingPhase1). The project application was rated at 12 points (with the quality threshold being 10 points, to the maximum of 15). Unfortunately, this was not enough to gain support for the project. In spite of that, the teaching staff has acquired vast experience in the preparation of projects of this level, contacts have been established, and partners have been identified for future high-level scientific projects.

ERAF project: "Analysis of laser marking process parameters of new industrial materials for high-tech applications", No. 1.1.1.2/VIAA/3/19/474. Project duration: 01.04.2020 - 31.03.2023. The aim of the project is to obtain optimal technological parameters of the laser marking process of new industrial materials based on theoretical and experimental studies and mathematically describe the mechanisms of this process. This project involves scientists from Bulgaria, a strategic partner of the RTA Faculty of Engineering.

Project NEW METRO embeddiNg kEts and Work based learning into MEchaTROnic profile, Nr.600984-EPP-1-2018-1-IT-EPPKA2-SSA http://www.newmetro.eu/. Project duration: 01.12.2018 - 30.11.2021. Partners: Sistemi Formativi Confindustria SCPA (Italy), CIS Scuola Per La Gestione D'impresa Societa' Consortile A RESP (Italy), Lombardini SRL (Italy), FH Joanneum Gesellschaft MBH (Austria), Technologiko Ekpedeftiko Idryma IPIROU (Greece), Ministero Dell'istruzione Dell'universita' E Edella Ricerca (Italy), Federazione Sindacale Dell'industria Metalmeccanica Italiana (Italy) Hanse Parlament (Germany), Wyzsza Szkola Logistyki (Poland), ENSE Generalitat de Cataluna (Spain), Rezekne Academy of Technologies (Latvia). Project objectives: 1) to develop a common European competency framework for mechatronics professionals; 2) to develop a learning platform and new teaching methods for mechatronics study programmes; 3) to foster cooperation in the field of mechatronics training between vocational education institutions, experts, employers (European Union companies) and policy makers.

These and the projects indicated in paragraph 2.4.2 have a positive impact on the implementation process of all study programmes of the SF, because the lecturers of the said study programmes work on these projects. Work on projects raises the qualification of lecturers, improves their knowledge of foreign languages, reveals new cooperation partners and opportunities to benefit from their expertise. Lecturers can later pass on the acquired knowledge and skills to their students. To the extent possible, students are also involved in the implementation of certain tasks of the project; within the framework of the projects, they develop their course projects and diploma theses. International research projects are particularly important for doctoral students, as they enable them to adopt the world’s best practices, carry out high-level scientific research, create innovations, transfer the acquired knowledge and skills to production and education system.

International cooperation in scientific research continues its development, new partners are sought, new project applications are prepared. Particular attention is paid to the preparation of ‘Horizon’ project applications. For example, there was prepared and on 07.10.2021 submitted the application Teaming for Excellence HORIZON-WIDERA-2022-ACCESS-01-two-stage project for “Center of Excellence in Photonics and Knowledge Transfer PHOTONICS-LV”, which along with the colleagues from the University of Latvia (Latvia), Lund University (Sweden), Westfaelische Wilhelms-Universitaet Munster (DE), Daugavpils University (LV) also involves researchers of RTA – lecturers of the SF subject to accreditation http://www.newmetro.eu/. The aim of the project is to increase the performance of Latvian research and innovation in photonics by modernising the Center of Excellence for Photonics and Knowledge Transfer of the University of Latvia FOTONIKA-LV (CoE FOTONIKA-LV). The project aims to increase the R&I performance of Latvia in Photonics through the upgraded Centre of Excellence in Photonics and Knowledge transfer FOTONIKA-LV (CoE FOTONIKA-LV) of the University of Latvia. The project provides that the existing Photonics Centre of the University of Latvia, Rezekne Academy of Technologies and Daugavpils University will be involved in the further operation of the modernised centre. The project application was rated at 12 points (with the quality threshold being 10 points, to the maximum of 15). Unfortunately, this was not enough to gain support for the project.

2.4.4. Specify the way how the higher education institution/ college promotes the

involvement of the teaching staff in scientific research and/or artistic creation. Provide the description and assessment of the activities carried out by the academic staff in the field of scientific research and/or artistic creation relevant to the study field by providing examples.

The involvement of RTA teaching staff in scientific research is regulated by the Regulation for Scientific Activity in the RTA. It states that scientific work is a mandatory part of work of the elected academic staff at RTA. A lecturer can carry out scientific work by working on projects, working part-time as a scientist (leading researcher, researcher, research assistant), scientific technical or scientific service personnel, developing his/her doctoral thesis. The results of the scientific work are reflected in the lecturers' scientific publications (or patents), without them it is not possible to elect a lecturer to an academic position, which takes place every 6 years. In addition to conducting lectures and practical classes, most lecturers also work on projects, including scientific ones. Some part of academic staff are also employed in production companies.

In order to promote the involvement of teaching staff in scientific/applied research, a motivation system that covers the three main aspects of motivation has been developed at RTA. FIRST, material support. A Scientific Publications Support Fund has been established at RTA, where staff elected into scientific positions can apply for financial support to cover all or part of the costs related to scientific publications. Using ERDF project funding, RTA covers “Horizon” projects evaluated above the quality threshold. In order to facilitate contract research, RTA regulations stipulate that deductions from RTA are planned only in cases should the amount of the contract exceed EUR 15 000. To the extent possible, RTA also announces internal scientific grants, where it is possible to obtain start-up funding for the development of a scientific idea, which can be further developed in national and international scientific projects. SECOND, methodological and career support. The basic support system developed by RTA provides an opportunity for the career development of academic staff, which is not possible without scientific activity. RTA doctoral study programmes provide an opportunity for scientific career development. RTA organises professional development courses and seminars on issues relevant to scientific work, such as scientific writing, academic probity, patent procedures, etc. THIRD, moral support. The annual award regulations developed by RTA also provide for such nominations as “Scientist of the Year”, “Innovation of the Year”, etc.

For more information on scientific activities, publications, patents, projects, achievements, etc. of the academic staff in the past 6 years, see their CV (Annex 11 and Annex 14).

2.4.5. Specify how the involvement of the students in scientific research and/ or applied research and/or artistic creation activities is promoted. Provide the assessment and description of the involvement of the students of all-level study programmes in the relevant study field in scientific research and/ or applied research and/or artistic creation activities by giving examples of the opportunities offered to and used by the students.

The following activities (at least 9 CP) related to scientific work are provided for in the study programme of Programmēšana un datortīklu administrēšana (1st level prof. higher education) :

- In the 2nd semester, a compulsory study course “Introduction to Research” (1 CP) is planned;

- the compulsory part of the qualification paper (8 CP) is the research of scientific literature; RTA Rector's Order No. 4-5/10 of 02.12.2011 stipulate that the study project must have at least 30 literature sources, including at least 5 scientific articles; the qualification paper must have at least 35 literature sources, at least 8 of which are scientific articles;
- the topics of the qualification paper are focused on novelty, in most cases they are related to solving the problems of IT companies; this work may include the performance of tasks related to scientific research, for example, research of scientific literature, designing of new equipment (possibly a patentable solution), approbation of developed equipment (collection of experimental data, establishment of regularities), etc.;
- students have free access to all laboratories and workshops of the Faculty of Engineering of RTA for their scientific work; according to the laboratory base, they are free to choose the research topic, receive consultations from lecturers and technical staff;
- during the defence of the qualification paper the State Examination Commission gives its opinion (high/low) regarding the commercialisation potential of the obtained outcomes. If the commercialisation potential is assessed as high, then the RTA shall consider possibility of patenting the obtained outcomes;
- involvement of students in European Researchers' Night events.

The 2nd level professional higher education bachelor study programme of Programming Engincer provides for all scientific work activities (except for the qualification work) given in the programme of Administration and Programming of Computer Systems and Computer Networks and is supplemented by the following (the total amount of these activities is at least 21 CP):

- The compulsory part of 4 study projects (2*4 CP) and Diploma project (12 CP) is the research of scientific literature; RTA Rector's Order No. 4-5/10 of 02.12.2011 stipulates that the Diploma project must have at least 50 literature sources, including at least 15 scientific articles;
- the topics of an diploma project are novelty-oriented, in most cases they are related to solving the problems of production companies or developing new products in information technologies; this work may include the performance of research-related tasks;
- the study programme stipulates that in order to obtain the diploma, a student must have at least one publication. One can publish a scientific article in any scientific publication. Students are also offered to do so within the framework of the collected articles suggested at the student international scientific and practical conference “Human. Environment. Technology”, or, the collected articles of the international scientific and practical conference “Environment. Technology. Resources” held by students of Faculty of Engineering of RTA (in the collection of ETR papers, usually a lecturer or an engineering design project supervisor is a co-author under the guidance of which the student has carried out his/her own research, since a student without any previous experience cannot achieve the quality of a scientific paper corresponding to the collection indexed in the SCOPUS database).

The academic master's study program "Electronic Commerce Information Systems" additionally includes the following activities:

- Study course "Scientific research methodology" (2 credits, Prof. P.Grabusts)
- All mandatory study courses are based on the achievements of industry science, especially, e.g., Data Science (2 KP, assoc.prof. S.Kodors);
- the topic of the master's thesis and the problems to be solved in it are oriented towards novelty; there must be at least 1 publication on the research results;
- a mandatory part of the master's thesis is the study of scientific literature; RTA rector's order no. 4-5/10 from 02.12.2011. determines that the master's thesis must contain at least 70

literary sources, including at least 35 scientific articles.

The Sociotechnical Systems Modeling doctoral study program includes all (except for the master's thesis) scientific work activities given in the Laser Technologies master's program and additionally the following (the total amount of activities is at least 100 CP):

- compared to the master's thesis, a much deeper, innovative, fundamental or applied scientific research;
- publication of research results in scientific journals and proceedings of international conferences, which are cited in SCOPUS or Web of Science databases;
- presentation of research results at international scientific conferences;
- participation in scientific projects.

An important factor for student involvement in research is the faculty's ability to engage students. As an example, we can mention assoc.prof., artificial intelligence researcher Dr.sc.ing. S. Kodoru, who in 2021 "#ZinātneLatvijai 2021" was included among 14 creative and inspiring modern Latvian scientists.

Other examples of students' getting involved in research studies (in programmes implemented within the framework of the study field) are given in paragraphs 2.4.2 and 2.4.3.

2.4.6. Provide a brief description and assessment of the forms of innovation (for instance, product, process, marketing, and organisational innovation) generally used in the higher education institution, especially in study field subject to the assessment, by giving the respective examples and assessing their impact on the study process.

Students are involved in research projects, company-commissioned research. The quality of studies is also ensured by the fact that a large part of professional specialization courses is led by practitioners currently working in the industry, including the founders and owners of manufacturing companies. A mandatory requirement for college and bachelor's degree diploma theses is to develop new equipment (for example, which is a part of the production line), to modernise the existing equipment or create a new innovative product, to test own development, to perform economic evaluation of its introduction into production. Master's and doctoral programmes are focused on industry-relevant research, the results of which would promote introduction of innovations in production.

In order to improve the quality of study process, RTA ensures that new ideas, pilot projects and technologies referring to scientific, technical, social, cultural or other field are applied in the study process and are aimed at achieving the strategic goals of RTA. RTA pays a particular attention to such indicators related to the study process as the compliance of the study programmes with current issues of engineering development, industry needs, and research-based studies. To that end, RTA has developed and implemented the following innovations:

- The job quality of RTA teaching staff is assessed based on the criteria of the student-focused approach and assessing the teaching staff's contribution to the improvement of the students' professional and scientific competence. The work quality coefficient determines the additional payment to the salary of the teaching staff for the next year.
- The possibilities of information and communication technologies are used: digitalised registration of students for semesters and study courses, digitalised system for registration of students' attendance of classes, managing remote study classes under the conditions of

Covid-19 crisis, etc.

- In 2015, RTA established the Eastern Latvia Technology High School, which promotes connection and succession of secondary and higher education.
- The first 4 semesters in the short cycle and bachelor programm are almost identical; this allows optimizing the use of financial resources of the SF. Lectures delivered within the first four semesters for students of both programmes are planned in one large group, so the cost per 1 student can be reduced. The saved funds can be used for improvement of the quality.

In order to optimise the use of financial resources allocated for the study process, joint lectures for RTA students of all study fields are delivered in the following courses: Entrepreneurship, Environmental and Civil Protection, Labour Protection, Introduction to Humanities. Within the framework of the Faculty of Engineering, lectures for students from different study fields are combined as well to make the study process more profitable; for instance, in Mathematics, Materials Science, Project Management and other courses, lectures are delivered to large combined groups.

2.5. Cooperation and Internationalisation

2.5.1. Provide the assessment as to how the cooperation with different institutions from Latvia (higher education institutions/ colleges, employers, employers' organisations, municipalities, non-governmental organisations, scientific institutes, etc.) within the study field contributes to the achievement of the aims and learning outcomes of the study field. Specify the criteria by which the cooperation partners for the study field and the relevant study programmes are selected and how the cooperation is organised by describing the cooperation with employers. In addition, specify the mechanism for the attraction of the cooperation partners.

The most important cooperation partners of SD in Latvia are shown in table 2.5.1.1.

2.5.1.1. table

The main cooperation partners in Latvia

Coooperation institution	Name
Higher education institutions and Institutes	Riga Technical University- RTU
	Vidzeme University of Applied Sciences (ViA)
	Ventspils University of Applied Sciences (VUAS)

	Liepaja University (LiepU)
	Latvia Academy of Agriculture (now Latvia University of Life Sciences and Technologies) Institute of Horticulture
Professional organizations	LATVIA INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ASSOCIATION - LIKTA
	Rezekne association of entrepreneurs - REUB
	Rezekne Special Economic Zone (SEZ)
Software development companies	SIA "Geidans Solutions Latvia"
	SIA “MsIdi”
	TestDevLabs

Cooperation partners are selected according to the criteria as follows:

- partner's contribution to the development of study programmes;
- opportunities to jointly prepare applications for scientific projects and implement them;
- attraction of partner staff for lecturing and conducting classes;
- opportunities for students to do internships; develop diploma theses and find a job in a partner company;
- opportunities for RTA staff to intern at a partner institution and ensure knowledge transfer to RTA;
- the possibilities of using the partner's resources to improve the facilities of RTA laboratories;
- staff who is ready to work together at the partner institution and RTA;
- opportunities to increase the number of RTA students in cooperation with a partner institution;
- the partner's influence on political and social processes that can bring benefit, stability and development to RTA.

Cooperation with RTU manifests itself in joint scientific projects over many years (see paragraph 2.4.2 and lecturers' CVs); part of SD lecturers have graduated from RTU, 3 lecturers have defended their doctoral theses at RTU (A.Teilāns, P.Grabusts, A.Martinovs). SD lecturers participate in the review of bachelor's and master's theses at RTU, and are the official reviewers of doctoral theses.

RTA and Vidzeme University of Applied Sciences have a joint doctoral programme. Cooperation with ViA is also manifested in the development of joint scientific projects. It is planned that VUAS could

be involved at the next stage of the joint doctoral study programme consortium.

Negotiations with partners have been started on the projects and activities as follows:

- Horizon 2020 programme project "Resilient Farming by Adaptive Microclimate Management", StarGate, contract no. 818187);
- Horizon 2020 Europe Framework research and innovation programme project "Twinning in Environmental Data and Dynamical Systems Modeling for Latvia", TED4LAT, contract no. 101079206).

Cooperation with Liepaja University manifests itself in the implementation of a joint project - currently, the project "Building the digital capacity of universities with the smart integration of online learning resources and analytics" (EduAim) No. 8.2.3.0/22/A/003 has been started. 5 SD lecturers (A.Teilāns, P.Grabusts, E .Skromulis, I. Zarembo, A. Zorins) and students are participating in the project. The project is related to the adaptation of distance learning courses Coursera and EdX to the market of Latvia.

Cooperation with the Institute of Horticulture is manifested in the implementation of a joint project - "Development of autonomous unmanned aerial vehicles based decision-making system for smart fruit growing" (No. lzp-2021/1-0134), in which 4 SD lecturers (S. Kodors, I. Zarembo, L. Litavniece, I.Apeināns) and students will be involved.

LIKTA (Latvia Information and Communication Technology Association) is a cooperation partner representing professional organizations. The Latvian IKT/IT Association was founded in 1998, uniting the leading companies and organizations of the telecommunication industry, as well as ICT professionals - currently more than 150 members. RTA is also a member of LIKTA. The purpose of LIKTA is to promote the creation of the information society and the development of the industry in Latvia.

REUB is an important local cooperation partner. It facilitates the provision of internships and job opportunities for students and informs about opportunities to conduct research for the needs of companies. RTA is a member of REUB and the staff involved in the implementation of the study direction participates in REUB activities, such as meetings, experience exchange events, exhibitions, etc. The cooperation with REUB is also facilitated by the fact that associate professor L.Litavniece, who works in the study direction, is a member of the Council of Rezekne association of entrepreneurs . She is a member of the Latgale Council of the Latvian Chamber of Commerce and Industry, a member of the Knowledge Economy Council of the Latvian Chamber of Commerce and Industry.

An important cooperation partner is Rezekne SEZ. A cooperation agreement was concluded between the Rezekne SEZ administration and RTA on the exchange of information and experience, scientific research and teaching methodical cooperation, as well as the implementation of student internship programmes; http://www.rsez.lv/index.php/en/about-us. Cooperation is facilitated by the fact that the director of the master's study programme, assistant professor S. Ežmale, has been the head of the Rezekne SEZ administration for many years.

Software development companies that are able to provide internships for students are more important for the study direction.

Internships in Rezekne are provided by such companies as SIA "Midis", SIA "Entrypoint", SIA "Laileo Software", SIA "Wunder Latvia". Since 2021 SIA "Geidans Solutions" provides 2 internships for RTA students throughout the year. The largest number of internships is provided by SIA "Midis". It should be noted that the interns mostly deal with the development of web applications, games, as well as database applications.

IT companies in Riga also have become much more open to the model of remote internship, which was used by the students of the study programme "Programming Engineer" . For example, in neighboring cities, students can find internships in companies such as "Scandiweb" (Jēkabpils) and "TestDevLab" (Daugavpils).

Cooperation with companies during the reporting period manifested itself in:

- provision of internships, development of theses and jobs opportunities for students;
- custom research for companies;
- lecturers' internships in companies;
- study tours for students and lecturers in companies;
- recommendations for improving and updating the content of study programmes (provided by company managers, leading specialists);

More about internships in sections 3.2.4.

All these activities contribute to the achievement of the SD goal and SD learning outcomes.

2.5.2. Provide the assessment as to how the cooperation with different institutions from abroad (higher education institutions/ colleges, employers, employers' organisations, municipalities, non-governmental organisations, scientific institutes, etc.) within the study field contributes to the achievement of the aims and learning outcomes of the study field. Specify the criteria by which the cooperation partners suitable for the study field and the relevant study programmes are selected and how the cooperation is organised by describing the cooperation with employers. In addition, specify the mechanism for the attraction of the cooperation partners.

SD pays special attention to cooperation and internationalization because it opens up opportunities for mobility of students and lecturers (more on that in section 2.5.3).

Cooperation partners are selected according to the criteria that is used for selecting partners in Latvia. Cooperation with foreign universities/scientific institutes is formed through development and implementation of joint scientific projects and study programmes.

Although RTA has concluded more than 170 contracts for the mobility of students and lecturers in the ERASMUS+ project, the mobility of students and lecturers was significantly slowed down by the Covid pandemic, as a result of which RTA actually did not have any outgoing mobility students for two academic years. Measures are being taken to improve the situation in the academic year 2022-2023.

The most significant activities of the reporting period.

In December 2022, three SD lecturers (A.Teilāns, A.Zorins, M.Kijaško) visited the Polish Bialystok University of Technology with the aim to build a cooperation in the field of Internet of Things (IoT). Lectures on the topic were held and opportunities for cooperation in ensuring student mobility were discussed.

Prof. A. Teilāns regularly cooperates with the students of the Estonian University of Life Sciences, where he delivers lectures on the Internet of Things (IoT). As a result of cooperation, joint materials in the field of advanced engineering and artificial intelligence have been developed.

RTA SD "Mechanics and metalworking, thermal energy, thermal engineering and mechanical

science" takes part in the implementation of the Mechatronics programme developed in cooperation with the colleagues of Jade Hochshule (JH) (Germany). SD lecturer A. Skromulis had studied at JH for a semesters when being a student, while A. Martinovs developed the experimental part of his doctoral dissertation at JH in 2005. JH guest lecturers have given lecture courses on programming languages to SD "Programming Engineer" students. In 2018, guest lecturer L. Lanssen conducted classes on Java technologies.

Along with RTA "Laser Technology" doctoral study programme, cooperation opportunities are being sought with colleagues from "Angel Kanchev" University of Ruse (Bulgaria).

In 2019 RTA began the cooperation with the Cyprus University of Technology and within the framework of this collaboration RTA student M. Elksne wrote her diploma project in English "Solar Energy Estimation system". The diploma project was developed together with the Cyprus University of Technology and was based on the need of solar power plant owners for an energy volume forecasting system for concluding electricity sales contracts. Unfortunately, the cooperation did not continue further.

Updating and improving the quality of the academic and scientific staff working in the SD doctoral study programme "Modelling of Sociotechnical Systems" is related to the participation of partners and, especially, foreign universities in the implementation of the study programme. A lecturer from the University of West Bohemia in the Czech Republic (M.doc. M.Kepka) has been involved in the teaching process.

Mechanisms for attracting foreign partners:

- ERASMUS opportunities for establishing contacts;
- preparation of applications for joint scientific projects and joint work in projects;
- private contacts.

The composition of the scientific committee of the collection of articles of the RTA international conference "Environment. Technology. Resources" gives an vidnence of the geography of cooperation. It includes colleagues from Germany, Estonia, Serbia, Belarus, Bulgaria, Italy, Russia, Lithuania, Romania, etc.

http://journals.rta.lv/index.php/ETR/issue/viewIssue/164/612

2.5.3. Specify the system or mechanisms, which are used to attract the students and the teaching staff from abroad. Provide the assessment of the incoming and outgoing mobility of the teaching staff in the reporting period, the mobility dynamics, and the issues which the higher education institution/ college faces with regard to the mobility of the teaching staff.

E project: Strengthening of the academic staff of Rezekne Academy of Technologies in the study fields “Mechanics and Metalworking, Heat Power Industry, Heat Engineering and Mechanical Engineering” and “Management, Administration and Real Estate Management”, No. 8.2.2.0/18/A/016 (duration 01.12.2018-30.11.2022; funding 646’999 EUR) provides for the involvement of 9 members of foreign teaching staff into academic work. An open competition is announced for the positions of lecturers, and foreign professors and doctors can apply for them. Within the framework of this project, prof. Josef Timmerberg from Jade Hochshule (Germany) delivers lectures to RTA students in the following courses: Electrical Engineering, Electronics and

Industrial Electronic Equipment, Electrical Machinery and Electrical Drive, Automatic Control Systems of Electrical Drive.

RTA has concluded more than 170 agreements for student and lecturer mobilities in the ERASMUS + project. Every student is free to use ERASMUS + project funding to organise their own mobility; there were no problems related to receiving funding during the reporting period. In terms of the number of outgoing ERASMUS + mobilities, RTA students and lecturers rank one of the leading positions among Latvian higher education institutions. Prior to mobility, the student together with the director of the programme draw up a plan for studies at a foreign higher education institution. It is as close as possible to the study plan of the current or following semester of the RTA programme. This approach ensures the recognition of all study courses acquired abroad and minimises the number of compulsory study courses that a student will have to take as a debt upon return from abroad.

During the reporting period, teaching staff from Bulgaria, Lithuania, Spain and Turkey delivered lectures in the programmes of the SD within the ERASMUS + project (see Table 2.5.3.1). The total number of incoming mobilities of foreign lecturers was 10. Number of outgoing mobilities of lecturers working in the RTA programmes of the SD subject to accreditation – 157 (see Table 2.5.3.2) Due to the Covid-19 crisis, there is observed a decline in the number of mobilities in recent years. See Annex19 for full information on the mobility of foreign lecturers and lecturers of the SD.

Table 2.5.3.1

The incoming mobility of foreign lecturers in the study programmes of the SD subject to accreditation

Academic year	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Number of incoming mobilities	1	3	3	1	2
Breakdown of incoming mobilities by country	Lithuania	Bulgaria – 1 Lithuania– 2	Lithuania -3	Lithuania	Bulgaria – 9 Turkey – 1 S– 4

Table 2.5.3.2

Outgoing mobilities of the SD lecturers

	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Number of outgoing mobilities	29	37	29	17	45

During the reporting period, students from Bulgaria, Lithuania, Spain, Germany and Turkey studied and completed their traineeships within the ERASMUS + project in the programmes of the SD (see Table 2.5.3.3). The total number of incoming mobilities was 25.

Table 2.5.3.3

Incoming mobilities of foreign students

Academic year	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Total number of mobilities	2	2	13	0	8
Mobilities for studies	2	2	8	0	5
Traineeship mobilities	0	0	5	0	3
Breakdown of mobilities by country	Turkey-2	Turkey – 2	Lithuania –2 Turkey – 5 Germany - 1	0	Bulgaria – 2 Spain– 1 Turkey – 5

During the reporting period, students of the study programmes of the SD subject to accreditation studied in Germany, Bulgaria, Turkey within the ERASMUS + project, but completed traineeships in Germany, Bulgaria and Slovakia. The total number of these outgoing mobilities – 37 (see Table 2.5.3.4).

Table 2.5.3.4

Outgoing mobilities of RTA students

Academic year	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Total number of mobilities	11	11	6	0	0

Breakdown of mobilities by country	Bulgaria – 2 Lithuania – 7 Bulgaria - 2 Sweden-1	Turkey–5 Germany – 4 Ciprus - 2	Turkey – 2 Germany – 2 Poland - 1 Lithuania - 1	0	0

For full information on incoming and outgoing mobilities of students see Annex 18.

Student mobility was severely hampered by the Covid pandemic, which resulted in two academic years of virtually no outgoing mobility students at the RTA. Measures are being taken to improve the situation in the 2022/2023 academic year.

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

2.6.1. Assessment of the fulfilment of the plan regarding the implementation of the recommendations provided by the experts during the previous accreditation of the study field, as well as the assessment of the impact of the given recommendations on the study quality or the improvement of the study process within the study field and the relevant study programmes.

According to the ESF project "Evaluation of Higher Education Study Programmes and Proposals for Quality Improvement" implemented by Council of Higher Education, the study programme prepared by experts is classified into the first group - a programme that is high-quality and sustainable.

Analyzing the previous evaluation of the study direction within ESF project "Evaluation of Higher Education Study Programmes and Proposals for Quality Improvement", the study direction received 6 general recommendations that apply to all study programsmes:

1. Increase involvement in scientific research.

From 2016 till 2018, 5 independent research centers were established in the Faculty of Engineering, one of which was the ICT research center, which employed ICT direction staff. At the end of 2018, all centers were merged into one structural unit "Engineering Institute" with stricter administration and quality control. Initially, ICT staff mostly worked in RTA grants and under the projects of other centers (2018-2019). By increasing experience and skills, the ICT direction started to apply and implement projects by itself, e.g.:

- 2020 VPP-COVID-2020/1-0009 "ARTSS: Prospective technologies for sustainable and secure services";

- 2020-2022 LZP-2019/1-0094 "Application of deep machine learning and data mining for the study of plant-pathogen interactions: apple and pear scab pathosystems".

For the next two years, the project 2022-2024 " Development of autonomous unmanned aerial vehicles based decision-making system for smart fruit growing (No. lzp-2021/1-0134)" will be implemented within the direction, in which students and doctoral students will be also involved. The ITC group even developed a specialization direction "Smart horticulture", which has been developed

in cooperation with the Institute of Horticulture (DI). One DI researcher (T.Bartulsons) is studying for a doctoral degree in the SD. One student (I.Apeināns) started working during his master's degree and is now studying for a Phd degree, and having become a lecturer at RTA, reads courses related to his work in projects. Thanks to the projects and students' involvement in their implementation, the number of publications for doctoral and master's students in databases such as Scopus and WoS has significantly increased. But thanks to the reward system for Q1-Q2 publications, introduced in 2020, the number of publications in high-level journals has also significantly increased. In addition, the direction attracted Dr. L.Litavnieci from another RTA scientific institute, who works with ITC staff on issues of commercialization and strategic development of prototypes. Since 2016 The ITC direction continues to cooperate with the State Land Service and periodically conducts contractual studies on automation issues, using artificial intelligence.

2. Activate cooperation with local governments, graduates and employers.

RTA has established a long-term and successful cooperation with employers and employers' organizations in the city of Rezekne and the Latgale region. Cooperation agreements on the provision of student internships have been concluded with the two largest employer organizations uniting Rezekne and Rezekne county - with the joint municipal institution "Rēzekne special economic zone authority" and the association "Rezekne Entrepreneurs Association". 20 commercial companies operate in the Rezekne special economic zone, including SIA "Leax Rēzekne" RSEZ, SIA "Midis" RSEZ, RSEZ SIA "Verems", RSEZ SIA "New Fules", "RSEZ SIA "Energy Resources CHP". On the other hand, the association "Rezekne Entrepreneurs Association" unites 22 commercial companies and institutions, which operate in financial sector. Long-term cooperation agreements have also been concluded between the educational institutions of Rezekne city municipalities, the institution "Rezekne Special Economic Zone Authority " and the association "Rezekne Entrepreneurs Association" on wider cooperation in the development of the study programme, including the organization of student internships.

Before the pandemic, the Faculty of Engineering had a good tradition - the Alumni Meeting, where graduates could discuss their achievements, work experience and future plans with lecturers in an informal atmosphere.

3. Activate cooperation with schools and colleges.

Being aware of the fact that high school and college students are potential students, the Faculty of Engineering takes various measures in the field of popularization of the IT field. The initiator in this area is the RTA Public Relations Department (PRD), which invites school administrators, teachers or subject educators to apply for a virtual conversation or a face-to-face meeting with RTA representatives so that students can get to know about the advantages and benefits of IF, Information Technology Center, a modern higher education institution, budget places in a state-founded university.

SD lecturers take part in field trips or visit schools in Rezekne in order to popularize the opportunities offered by the direction. Every year there are also open-door days and Scientists' Nights for prospective students.

4. To improve the e-study environment.

This is done continuously. In the study process, RTA uses the Moodle system. The RTA Regulations on the lecturer stipulate that for each study course the lecturer develops a study course description in accordance with the regulations approved by the RTA Study Council "Regulations on the development of study course/module descriptions in RTA", as well as study course materials, which cover the theoretical material of the study course, student self-examination tasks, independent work assignments, criteria/materials for assessment of leaning outcomes. The lecturer posts the

study course materials on the study course website ekursi.rta.lv, following the "Methodological recommendations for the creation and maintenance of the study course content on the website ekursi.rta.lv" approved by the RTA Study Council. The study course template has been developed, including survey templates that the teaching staff can use for feedback after the study course, which makes it easier for lecturers to create a study course in Moodle.

5. Young scholars shall publish in journars of higher value.

It is planned to ensure the publicity of young scientists in high-value publications through the involvement of students in scientific projects.

6. It is recommended to create an alumni association.

RTA has established an association "RTA alumni association", which unites the graduates of Rezekne Higher Education Institution and Rezekne Academy of Technologies, promotes and supports Rezekne Academy of Technologies, promotes the inclusion of graduates in academy events and lifelong learning programmes. The association has the status of a public benefit organization and it organizes various events and promotes RTA.

The expert recommendations directly applicable to the study programme "Programming Engineer" have been taken into account and incorporated in the programme:

1. Revised and updated study course programmes.

2. Study course programmes and calendar plans are included in the Moodle environment.

3. Study materials developed by lecturers are available to students in the Moodle environment.

4. Additional foreign language courses for academic staff have been organized.

5. There have been discussions about attracting highly qualified professionals to the study process.

6. Additional databases are subscribed for the activation of scientific work.

7. Work is underway to motivate students for the development of scientific-research works and studies.

2.6.2. Implementation of the recommendations given by the experts during the evaluation of the changes to the study programmes in the respective study field or licensed study programmes over the reporting period or recommendations received during the procedure for the inclusion of the study programme on the accreditation form of the study field (if applicable).

During the reporting period, the changes in the study direction study programmes are as follows:

Study programme "Programming and computer network administration"

- it was decided to change the name of the study programme from "Programming and computer network administration" to "Programming", which is related to the fact that the programme will be based on the requirements of the occupational standard "Programmer";
- it was decided to abandon the module "Administrator of computer systems and computer networks" because the demand has decreased and the number of people who want to study is not sufficient to ensure a financially sustainable specialization;
- it was decided to close the part-time extramurral study form due to low demand;

- it was decided to close the study programme at the RTA Madona branch. The number of people who wanted to study was initially large, but gradually it decreased, as a result, the implementation of the programme became financially unprofitable;
- the occupational standard "Programmer" was updated on June 8, 2022. The changes were made in the content and learning outcomes of the study programme.
- the study plan has been developed and coordinated with the "Programming Engineer" study programme so that graduates can continue their studies starting from the 3rd year.

Study programme "Programming engineer"

- due to changes in the classification of education in Latvia, which are regulated by the Cabinet of Ministers regulations no. 322 "Regulations on the Classification of Latvian Education" (approved on 13.06.2017), the code for the study programme was changed from 42481 to 42484, which confirms the compliance of the programme with the thematic group of natural science, mathematics and information technology education, the thematic field of computer science education and the group of software programmes;
- On March 9, 2022, the changes to the study programme were approved, setting English as the language of implementation. These changes were introduced due to the cooperation initiated by RTA with London Metropolitan University, which provided mutual recognition of the study content and the possibility for RTA students to continue their studies at Metropolitan University. For this purpose, an external expertise for the RTA programme was conducted in 2020, but despite the fact that the experts supported the cooperation model between the RTA and the London Metropolitan University, unfortunately it has not yet been implemented in practice. It was affected by the crisis of attracting foreign students caused by Covid and the unfavorable financial conditions of cooperation for RTA. Currently, new solutions for attracting foreign students are being sought;
- it has been decided to close the form of part-time extramurral studies due to low demand;
- at the time of the preparation of accreditation materials, the occupational standard "Programming engineer" was valid according to the meeting minutes No. 5 of June 17, 2009. The reasearch on the compliance of the study programme with this standard has been carried out, as well as the compliance with the project version of the "Programming engineer" standard, which LIKTA directs/coordinates for approval by the Ministry of Education and Culture
- the first two study years of the programme are coordinated with the short-cycle programme "Programming and computer network administration", which is a part of the professional bachelor's study programme " Engineer of Programming".

Study programme "Electronic commerce information systems"

- there are no changes in the programme structure and lengths of implementation.
- new study courses that are relevant in the e-commerce industry have been introduced

Study programme "Modelling of socio-technical systems" (joint with Vidzeme University of Applied Sciences (ViA).

- there are no changes in the programme structure and lengths of implementation.
- study courses are arranged so that more effective mobility of lecturers and doctoral students can be ensured, i.e. the implementation of study courses can be carried out either at RTA or ViA.

Annexes

I - Information on the Higher Education Institution/ College		
Information on the implementation of the study field in the branches of the higher education institution/ college (if applicable)		
List of the governing regulatory enactments and regulations of the higher education institution/ college	Annex 1.docx	1.pielikums.docx
The management structure of the higher education institution/ college	Annex 2.docx	2.pielikums.docx
II - Description of the Study Field - 2.1. Management of the Study Field		
Plan for the development of the study field (if applicable)	Annex 3.docx	3.pielikums.docx
The management structure of the study field	Annex 4.docx	4.pielikums.docx
A document certifying that the higher education institution or college will provide students with opportunities to continue their education in another study programme or another higher education institution/ college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.	Annex 5.docx	5.pielikums.7z
A document certifying that the higher education institution or college guarantees compensation for losses to students if the study programme is not accredited or the study programme license is revoked due to actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.	Annex 6.docx	6.pielikums.edoc
Standard sample of study agreement	annex 7.docx	7.pielikums.docx
II - Description of the Study Field - 2.2. Efficiency of the Internal Quality Assurance System		
Analysis of the results of surveys of students, graduates and employers	Annex 8.7z	8.pielikums.7z
II - Description of the Study Field - 2.3. Resources and Provision of the Study Field		
Basic information on the teaching staff involved in the implementation of the study field	Annex 9.xlsx	9.pielikums.xlsx
Biographies of the teaching staff members (Curriculum Vitae in Europass format)	Annex 10.7z	10.pielikums.7z
A statement signed by the rector, director, head of the study programme or field that the knowledge of the state language of the teaching staff involved in the implementation of the study programmes within the study field complies with the regulations on the state language knowledge and state language proficiency test for professional and official duties.	Annex 11.docx	11.pielikums.edoc
A statement of the higher education institution/ college on the respective foreign language skills of the teaching staff involved in the implementation of the study programme at least at B2 level according to the European Language Proficiency Assessment levels (level distribution is available on the website www.europass.lv, if the study programme or part thereof is implemented)	Annex 12.docx	12.pielikums.edoc
II - Description of the Study Field - 2.4. Scientific Research and Artistic Creation		
Summary of quantitative data on scientific and/ or applied research and / or artistic creation activities corresponding to the study field in the reporting period.	Annex 13.docx	13.pielikums.docx

List of the publications, patents, and artistic creations of the teaching staff over the reporting period.	Annex 14.docx	14.pielikums.docx
II - Description of the Study Field - 2.5. Cooperation and Internationalisation		
List of cooperation agreements, including the agreements for providing internship	Annex 15.docx	15.pielikums.docx
Statistical data on the teaching staff and the students from abroad	Annex 16.docx	16.pielikums.docx
Statistical data on the incoming and outgoing mobility of students (by specifying the study programmes)	Annex 17.docx	17.pielikums.docx
Statistical data on the incoming and outgoing mobility of the teaching staff	Annex 18.docx	18.pielikums.docx
II - Description of the Study Field - 2.6. Implementation of the Recommendations Received During the Previous Assessment Procedures		
Report on the implementation of the recommendations received both in the previous accreditation and in the licensing and/ or change assessment procedures and/ or the procedures for the inclusion of the study programme on the accreditation form of the study field.	Annex 19.docx	19.pielikums.docx
An application for the evaluation of the study field signed with a secure electronic signature	IESNIEGUMS_ENG.edoc	IESNIEGUMS_LV.edoc
III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme		
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period		
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme		
The curriculum of the study programme (for each type and form of the implementation of the study programme)		
Descriptions of the study courses/ modules		
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		

Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Other annexes

Name of document	Document

Programming (41484)

Study field	*Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science*
ProcedureStudyProgram.Name	*Programming*
Education classification code	*41484*
Type of the study programme	*First level professional higher education study programme*
Name of the study programme director	*Sergejs*
Surname of the study programme director	*Kodors*
E-mail of the study programme director	*Sergejs.Kodors@rta.lv*
Title of the study programme director	*Dr.sc.ing.*
Phone of the study programme director	*28342737*
Goal of the study programme	*to prepare students for the profession of Programmer (profession code 2512 05) enhancing their personality development; promote the acquisition of knowledge and skills that ensure the attainment of the fourth level professional qualification "Programmer" (08.06.2022., protocol No.3) and foster competitiveness in changing socio-economic conditions; create motivation for further education and provide an opportunity to prepare for attainment of second level professional higher education and fifth level professional qualification in the field of computer science.*
Tasks of the study programme	*1.To provide comprehensive knowledge in the general educational courses of information technology, computer engineering, electronics, telecommunications, computer management and computer science.* *2. To provide specialized factual and theoretical knowledge in the field of programming.* *3. To create and develop skills in the practical application of acquired knowledge in accordance with the basic requirements of the Programmer's professional qualification and the specific requirements necessary for the performance of the programmer's duties and main job responsibilities.* *4. To acquire a broad perspective provided within education, as well as knowledge of professional ethics, which in turn would ensure an understanding of the impact of the implementation of respective projects on the environment and society;* *5. To prepare competitive specialists who are able to solve the problems of the field and participate in the development of information technologies.* *6. To improve the skills of strategic and analytical thinking and to develop the ability to work in an interdisciplinary team of industry specialists.* *7. To cultivate knowledge of foreign languages, which would ensure the ability to cooperate with colleagues from other countries, work and continue studies abroad.* *8. To create an orientation for studies at the professional bachelor's level.* *9. To develop skills necessary for independent studies and lifelong learning.*

Results of the study programme	*Z1 Able to demonstrate comprehensive and specialized knowledge and understanding of facts, theories, regularities and technologies relevant to the field of software development.* *P1 In the field of software development, the student is able to develop a minimum viable product (MVP) and realize its prototype, applying the Start-Up methodology.* *P2 Able to analyse requirements, design and model the system, communicate with the client and prepare appropriate software documentation.* *P3 Able to implement software according to documentation, choose implementation technologies, implement programme code according to best practice principles, security and performance considerations, prevent programme errors and implement its testing, as well as maintain and implement systems.* *K1 Able to manage risks, choose an appropriate project management method, plan and organize work, participate in brainstorming meetings and sprint planning, and prepare a project plan.* *K2 Is motivated to engage in science, to participate in the implementation of smart and cyber-physical systems, proves readiness to improve their competences and knowledge.*
Final examination upon the completion of the study programme	*The qualification exam, which includes the defense of the qualification thesis.*

Study programme forms

Full time studies - 2 years - latvian

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*80*
Admission requirements (in English)	*Secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*-*
Qualification to be obtained (in english)	*Programmer*

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

Full time studies - 2 years - latvian

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*80*
Admission requirements (in English)	*Secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*-*

Qualification to be obtained (in english)	*Programmer*

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

3.1. Indicators Describing the Study Programme

3.1.1. Description and analysis of changes in the parameters of the study programme made since the issuance of the previous accreditation form of the study field or issuance of the study programme license, if the study programme is not included on the accreditation form of the study field, including changes planned within the evaluation procedure of the study field evaluation procedure.

1. The parameters of the study programme:

1.	Title of the study program in Latvian	**“Programmēšana”**	
2.	Title of the study program in English	*“Programming”*	
3.	Occupational standard, the year of its approval	"Programmer" (8 June 2022, meeting minutes No. 3)	
4.	Code of the study program according to the Latvian Education Classification	41484	
5.	-	**-**	
6.	Type of study program	first level professional higher education study programme	
7.	Qualification level to be acquired (NQF / EQF)	5.	
8.	Studiju programmas apjoms (KP, rekomendējoši arī ECTS)	80 CP (120 ECTS)	
9.	Form, type, duration and language of implementation		
	full-time studies	2 years	Latvian
10.	Implementation place	Rēzeknes Tehnoloģiju akadēmija, Atbrīvošanas aleja 115, Rēzekne, Latvija	
11.	Admission requirements	CE in Mathematics CE in Latvian CE in a foreign language * other persons other CE passed by a person for attainment of general secondary education.	
12.	The degree to be conferred, professional qualification or degree and professional qualification	4th level professional qualification “Programmer”	

13.	The final examination at the end of the study program	The qualification exam, which includes the defense of the qualification thesis.*
14.	Director of the study programme	Sergejs Kodors, Dr.sc.ing.

*The qualification exam consists of: 1) developed software (65%); 2) developed SRS(10%); 3) developed SDD (10%); 4) developed user instructions (5%); 5) presentation and video demonstration of the project (10%).

2. The aim of the study programme is to prepare students for the profession of Programmer (profession code 2512 05), enhancing their personality development; promote the acquisition of knowledge and skills that ensure the attainment of the fourth level professional qualification "Programmer" and foster competitiveness in changing socio-economic conditions; create motivation for further education and provide an opportunity to prepare for attainment of second level professional higher education and fifth level professional qualification in the field of computer science.

3. Tasks of the study programme:

1. To provide comprehensive knowledge in the general educational courses of information technology, computer engineering, electronics, telecommunications, computer management and computer science.
2. To provide specialized factual and theoretical knowledge in the field of programming.
3. To create and develop skills in the practical application of acquired knowledge in accordance with the basic requirements of the Programmer's professional qualification and the specific requirements necessary for the performance of the programmer's duties and main job responsibilities.
4. To acquire a broad perspective provided within education, as well as knowledge of professional ethics, which in turn would ensure an understanding of the impact of the implementation of respective projects on the environment and society;
5. To prepare competitive specialists who are able to solve the problems of the field and participate in the development of information technologies.
6. To improve the skills of strategic and analytical thinking and to develop the ability to work in an interdisciplinary team of industry specialists.
7. To cultivate knowledge of foreign languages, which would ensure the ability to cooperate with colleagues from other countries, work and continue studies abroad.
8. To create an orientation for studies at the professional bachelor's level.
9. To develop skills necessary for independent studies and lifelong learning.

4. Learning outcomes to be achieved

Z1 Able to demonstrate comprehensive and specialized knowledge and understanding of facts, theories, regularities and technologies relevant to the field of software development.

P1 In the field of software development, the student is able to develop a minimum viable product (MVP) and realize its prototype, applying the Start-Up methodology.

P2 Able to analyse requirements, design and model the system, communicate with the client and prepare appropriate software documentation.

P3 Able to implement software according to documentation, choose implementation technologies, implement programme code according to best practice principles, security and performance

considerations, prevent programme errors and implement its testing, as well as maintain and implement systems.

K1 Able to manage risks, choose an appropriate project management method, plan and organize work, participate in brainstorming meetings and sprint planning, and prepare a project plan.

K2 Is motivated to engage in science, to participate in the implementation of smart and cyber-physical systems, proves readiness to improve their competences and knowledge.

5. Analysis of changes in study programme parameters

1) It has been decided to stop the implementation of a part-time extramural study form due to low demand.

2) It has been decided to exclude part-time extramural study module "Administrator of computer systems and computer networks" because the demand has decreased, and the number of those who want to study is not sufficient to ensure a financially sustainable specialization. Accordingly, the programme is based only on the requirements of the occupational standard "Programmer".

3) A decision has been made to change the name of the study programme from **Programming and computer network administration** to **Programming**, which is related to the fact that the programme will be based on the requirements of the occupational standard "Programmer".

4) The study programme is not implemented in RTA branch in Madona. The number of people who wanted to study was initially large, but gradually it decreased, and as a result, the implementation of the programme in branches became financially unprofitable.

5) The occupational standard "Programmer" was updated on 8 June 2022, accordingly changes were made in the content of the study programme and its learning outcomes.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree, professional qualification/professional qualification requirements or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

Study direction: Information technology, computer engineering, electronics, telecommunications, computer management and computer science.

Analysis of compliance to study direction and profitability

Direction strategy is included in “Development strategy of Rezekne Academy of Technology 2016-2023” (full version available in Latvian).

Objective: prepare ITC specialists considering employer requirements

The structure of the study programme and the content of the study courses ensure compliance with the requirements of the occupational standard "Programmer" (profession code 2512 05). The study programme is one of the stages of the educational chain of the study direction, which ensures the principle of succession (1st level studies - bachelor's studies - master's studies - doctoral studies). Graduates of the study programme may continue their studies in the professional bachelor's study

programme "Programming Engineer". The study plan is designed and coordinated with the study programme "Programming Engineer" so that graduates can continue their studies starting from the 3rd year. Considering the principle of succession, it is correct decision to disclose module “Computer Network Administration”, because it is not supported by next level study programs (meanwhile, “Software engineer” supports the module “Programming”).

The compliance of the study programme with the study field has also been defined by the Sectoral Expert Council (NEP) of the production of electronic and optical equipment and information and communication technologies of Employers' Confederation of Latvia (LDDK), because the professional qualification – Programmer (which is obtained after graduation of the study programme) is included in the map of professions of the given branch (see https://registri.visc.gov.lv/profizglitiba/dokumenti/nozkval/NKSK_elektron_un_ikt.pdf, only in Latvian)

According to “Labour market forecasts of Latvia until 2040” published by Ministry Economics Republic of Latvia (https://www.nva.gov.lv/lv/media/16089/download?attachment, 20 page, only in Latvian), the profession group "Programming" will have a labor shortage 1627, which is the 6th largest group from the top 20 list in 2030. According to The European Software Skills Alliance (ESSA) report 2021 “Europe’s Most Needed Software Roles and Skills”: “Despite the strong growth of the sector, Eurostat (2020) still also reports a shortage of ICT professionals, or at least that some organisations have difficulty filling vacancies”. (https://www.softwareskills.eu/wp-content/uploads/2021/10/Europes-Most-Needed-Software-Roles-and-Skills_ESSA-Needs-Analysis-Report-2021.pdf, ENG). According to *“The Future of Jobs report of the World Economic Forum (2020)” forecast until 2025, group “Software and Applications Developers”* is the 9th most required profession, meanwhile, “AI and *Machine Learning Specialists*” is the 2nd (https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf, 30 page, ENG).

“Programming” students get basics of AI in the 2nd course and can continue to study in “Software engineering” obtaining advanced knowledge in data analysis, AI and machine learning.

The study program “Programming” supports RTA strategy, its profitability is education of ITC specialists considering a shortage of labour market in Latvian, EU and international level. The program is implemented by following international trends and promoting the regeneration of specialists, contributing to the growth of the economy and production in the field of ICT.

Objective: stimulation of research studies in IT

Institute of Engineering, the department of the Faculty of Engineering, works in the field of science "2.2. Electrical engineering, electronics, information and communication technologies". Software development skills provides a possibility to students to develop prototypes in the field of intelligent solutions, which enable them to engage in research projects and engage in applied studies. The obtained knowledge, skills and competence allow students to continue studying at programmes “Software Engineering” and “Mechatronics”, which are more closely related to research in the field of smart solutions. Starting from group 2022, the students must participate in the international scientific student conference.

Analysis of compliance to study programme features

Regulation No. 322 “Regulations on Latvian education classification”

Study programme code: 41484

The title, aim, tasks, learning outcomes of the study programme and professional qualification of the Programmer to be acquired are interrelated and fully comply with the requirements of the Latvian Qualifications Framework (LQF) harmonised with the European Qualifications Framework and the professional standard of a Programmer. The study programme typologically and in terms of

its content corresponds to the thematic group of Natural sciences, mathematics and information technology (the component of the code 4) to the thematic area of Computer science programmes (component of the code 48) and to the group of Software programmes (the component of the code 484) determined by the LQF. Due to the fact that the Programme in the future will be based only on the requirements of the 4th professional qualification level (PQL) occupational standard "Programmer", a change of the name of the study programme from "Programming and computer network administration" to "Programming" is applied for accreditation, which is fully in line with the LQF regulations.

Regulation No. 141 "Regulations regarding the State Standard for First Level Professional Higher Education"

The volume of the study programme is 80 CP (120 ECTS), the duration of implementation is 2 years. During this time, the knowledge, skills and competences specified in the standard of the profession of "Programmer" can be fully acquired.

Analysis of admission requirements:

The structure of the study programme and the content of the study courses ensure achievement of the learning outcomes of the study programme, which are defined on the basis of the requirements of the LQF and the professional standard of a "Programmer". The study programme has been implemented at RTA since 2015. Admission requirements have not changed fundamentally during this time. The gained experience leads to the conclusion that the results of the centralised examinations in mathematics, Latvian language and literature and a foreign language are fully sufficient for the successful acquisition of the study programme. Extra points are awarded for the grade in the Secondary School Certificate in Informatics, Physics, Chemistry and Natural Sciences. The results of the last two years' matriculation show that 30 out of 42 students have taken the final exam in Informatics. The average score in Informatics for RTA students is 72%, which could indicate a good basic level for studies in the field of programming. However, the analysis of the real situation shows that most of the new students are either unable to code or have very little programming knowledge. Therefore, study programme includes material to fulfill the knowledge and skill gap.

3.1.3. Economic and/ or social substantiation of the study programme, analysis of graduates' employment.

Economic and social rationale

Official national statistics

According to the data of the Central Statistics Bureau of Latvia (CSB), available in the report "Use of information and communication technologies and e-commerce in companies in 2019", in 2019, an average of 20.1% of companies employed ICT specialists. Most ICT specialists are employed by large companies (76.4%), less by medium (35.0%) and small (15.6%) companies. In 2018, 5.7% of companies tried to hire ICT specialists. 17.2% of large companies, 4.2% of medium-sized and 1.8% of small companies had difficulty to find and hire ICT specialists.

According to the "Macroeconomic Review of Latvia 2021" of the Ministry of Economics, the Covid-2019 crisis contributed to the increase in the unemployment rate, while at the same time it accelerated the digitization of the economy and the automation of different professions. The

number of employees in the "Information and communication services" has increased by 1 thousand, which affects the stability of the profession in the labor market, accounting for 4% of the total number in the country. The export of ICT services accounts for 19% in 2020, sharing the first place with road transport. At the same time, the import of ICT services accounts for 11%, taking the first place, shared with travel services.

ICT sector indicators in Latvia

According to the data of the CSB of Latvia, presented in the "Use of information and communication technologies and e-commerce in companies in 2019" report, the number of companies in the ICT sector increased by one and a half thousand in the period 2014-1019. In 2018, most of them operate in various sectors of provision of ICT services (6,239 companies). The total turnover of ICT sector companies in 2018 reached 3,792.9 million euros. The largest propotion (55.9%) of the total turnover of ICT sector companies is provided by ICT service sector companies, while the smallest (8.7%) is provided by ICT production sector companies. However, the group "Computer programming, consulting and related activities" accounted for 40.7% of the provision of ICT services in 2018 and ranked second after the group "Telecommunications".

Specialist demand forecasts

LV: According to the labor market forecast of the Ministry of Economicw of Latvia until 2040, in 2030 the "Programming" group will have a labor shortage of 1,627, which is the 6th largest group from the top 20 list.

EU: According to "*The European Software Skills Alliance (ESSA)*" *2021* report: despite the increase of specialists, the shortage of ICT specialists remains relevant.

Globally: According to "*The Future of Jobs report of the World Economic Forum (2020)*" forecast until 2025, the group "*Software and Applications Developers*" ranks 9th in the list of the most demanded professions, while "*AI and Machine Learning Specialists*" takes the 2nd place and is available to graduates who continue their studies in the bachelor's programme "Programming engineer", while 1st level programme guarantees the necessary basic knowledge and skills.

Demand for ICT specialists

The State Employment Agency held an express survey of employers in 2022. It found out that ICT services (90%) are needed even more often than average. ICT services (45%) have used state support for employee training more often than average. A third (33%) of the employers' company/institution have budgeted expenses for training. More often, the training budget is intended for information and communication services (54%). Employers in Latgale (75%) more often expect professional skills from their employees, but in workplaces in Riga (60%) they are required less often than average. From a regional point of view, Latgale (50%) is planning to use state support more often than other regions on average.

The data show that there is a shortage of software developers in the labor market both in Latvia, the EU and in the world. Current forecasts show that the demand will only increase in the coming years. Latgale employers are especially dependent on state support, including the demand for higher education specialists.

Analysis of graduate employment

At the university level

According to the report of the Ministry of Education and Culture "Employment progress of graduates of higher education institutions in 2019" around 88% of graduates of higher education institutions were employed in 2019. The employment rate of RTA graduates, who have acquired highly qualified

professions, is 79%, which is equal to Daugavpils University that is the second HEI of Latgale region, but it is lower than the national average of 83%. However, it should be taken into account that the number of unemployed in Latgale is more than twice as high as the national average number, and almost 3 times higher than it is in Riga region (The report of the Ministry of Economics of 2022), which is related to the lack of vacancies in the region. In 2020 the unemployment rate in Laitgale region was 15.4%. Summing up, the difference of 2% in the employment of highly qualified specialists indicates the significant positive impact of HEIs on the society and their well-being in the region - higher education allows graduates to be employed and competitive. It should be noted that the difference from RTU and LU is only 4% and 7%, respectively, considering that both HEIs are located in a more favorable region in terms of the number of job vacancies and salary.

At the study programme level

Analyzing the open data of the Ministry of Education and Culture "Graduates of 2017-2019 of higher education institutions in 2020" by codes 41481 and 41484, the employed graduates in 2020 in Latvia make up 88%, adjusting the number of emigrants and individuals about whom there is no information. In case of the RTA study programme "Programming and computer network administration", the number of employees is 83.3%, which is slightly higher than the average indicator. For comparison, in LU the employed graduates make up 88.9%. 10 out of 10 graduates of the RTA study programme were employed in 2017, 11 out of 13 in 2018 and 4 out of 7 in 2019 (the data includes those graduates who have provided the information of their employment). If we take into account only graduates of 2017-2018, 91.3% are employed, which is above the average indicator. A significant employment decrease can be observed in 2019 with the group that completed their studies before Covid-2019 crisis. According to SEA data, all graduates of 2017-2021 are employed in the year 2020. One graduate of the alumni of 2020-2021 was unemployed in 2020, which is probably also related to the impact of Covid-19.

Analyzing the graduates' work sector 41481 and 41484 in Latvia, only 53.9% work in the NACE J sector ("Information and communication services"), but in LU case it is 73.6%. If LU is excluded from the analysis, the average number in Latvia is only 27.4%, but in RTA - 28.6%. A fair number of RTA graduates work in the NACE O sector ("Public administration and defence; compulsory social security"), accounting for 33% (out of 21) (LU - 1% out of 298). In the context of the high unemployment rate in Latgale region, this can be evaluated positively, because the graduates have an alternative job in the public sector, which also requires qualified IT specialists. By combining NACE groups J and O, it makes up 61.9%.

Analyzing graduates' employment professions 41481 and 41484 in the ISCO-2 group, LU is the leader by a significant margin of 70.2%. If LU is not included in the report, only 38.5% of graduates work in the ISCO-2 field in Latvia. In RTA it is 43.9% which is better than the average indicator in the country. Another popular group among graduates is ISCO-3: LU (21.89%), RTA (28.6%), and 22.3% in Latvia when excluding LU from the report. It shows commensurate indicators in Latvia.

Employment of RTA graduates in IT companies

Graduates of the study programmēšanas work in such software development companies as SIA "Midis", SIA "Lailio Solutions", SIA "Entrypoint", SIA "TestDevLab" and SIA "Geidans Solutions Latvia", etc.

Conclusions on the employment of RTA graduates

Not taking into account the period of the Covid-2019 crisis, 91.3% of the graduates of the study programme are employed, despite the fact that Latgale region has the highest unemployment rate in the country, accounting for 15.4% in 2022. Comparing the employment of graduates according to their professions, RTA graduates have better results than the average situation in Latvia, but

slightly lower than the indicators of LU, which is influenced by the economic situation of Latgale region.

3.1.4. Statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down into different study forms, types, and languages.

Full-time study programme (Rezekne and Madona):

	Statistical data on students 1st level study program "Programming" full time studies															
Academic years	**2015/2016**		**2016/2017**		**201./2018**		**2018/2019**		**2019/2020**		**2020/2021**		**2021/2022**		**2022/2023**	
Funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding
the 1st year	32 (20M)*	0	32 (9M)	0	23	0	25	0	23	0	25	2	18	0	22	0
the 2nd year	13 (13M)	0	40 (25M)	0	39 (8M)	0	17	0	22	0	27	0	28	0	20	0
TOTAL	**45 (33M)**	**0**	**72 (34M)**	**0**	**62 (8M)**	**0**	**42**	**0**	**45**	**0**	**52**	**2**	**46**	**0**	**42**	**0**

M - Madona branch

The number of admitted students from AY 2017-2018 until 2022-2023 remains stable - an average of 21 students per year. The high number of admitted students is explained by high interest in Madona branch in 2015-2016. Since 2018 the study programme is implemented only in Rezekne.

AY 2021-2022 is characterized by a significant drop in the number of admissions, which is related to the unstable economic situation caused by Covid-19. On the other hand, in AY 2020-2021 there was the smallest number of graduates affected by the first wave of Covid-19. Last five years (since 2017), on average, the number of graduates is 5 students or 24% of the enrolled number.

Statistical data on student's exmatriculation 1st level study program „Programming"																
Academic years	**2015/2016**		**2016/2017**		**201./2018**		**2018/2019**		**2019/2020**		**2020/2021**		**2021/2022**		**2022/2023**	
Funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding	Budget funding	Personal funding
TOTAL (with graduates)	**4 (2M)**		**33 (28M)**		**43 (8M)**		**21**		**19**		**26**		**26**		**2**	
TOTAL (excluding graduates)	**3 (1M)**		**22 (21M)**		**31 (5M)**		**14**		**14**		**24**		**21**		**2**	

the 1st year	**3 (1M)**	**0**	**4 (3M)**	**0**	**8**	**0**	**4**	**0**	**3**	**0**	**2**	**2**	**5**	**0**	**2**	**0**
do not start studies			3 (3M)	0	1	0										
due to the expiry of the Erasmus+ agreement													1	0		
own wishes	3 (1M)	0	1	0	3	0	4	0	3	0	2	2	2	0	2	0
insufficient study results					4	0							2	0		
the 2nd year	**0**	**0**	**18 (18M)**	**0**	**23 (5M)**	**0**	**10**	**0**	**11**	**0**	**20**	**0**	**16**	**0**	**0**	**0**
own wishes							2	0			1	0				
non-renewal of studies after academic leave					4	0	1	0								
insufficient study results			18 (18M)	0	19 (5M)	0	7	0	11	0	19	0	16	0		
TOTAL	**3 (1M)**	**0**	**22 (21M)**	**0**	**31 (5M)**	**0**	**14**	**0**	**14**	**0**	**22**	**2**	**21**	**0**	**2**	**0**
do not start studies			3 (3M)		1	0										
due to the expiry of the Erasmus+ agreement													1	0		
own wishes	3 (1M)	0	1	0	3	0	6	0	3	0	3	2	2	0	2	0
insufficient study results			18 (18M)	0	23	0	7	0	11	0	19	0	18	0		
non-renewal of studies after academic leave					4	0	1	0								
as having obtained a professional qualification	1 (1M)	0	11 (7M)	0	12 (3M)	0	7	0	5	0	2	0	5	0	0	0

The most common reason of exmatriculated in the 1st year is student's own desire. In the 2nd year, the main reason for exmatriculation is academic failure. That is explained by the short time of study program (2 years long).

Tuition by correspondence and foreigners: study programme have not been providing.

3.1.5. Substantiation of the development of the joint study programme and description and evaluation of the choice of partner universities, including information on the development and implementation of the joint study programme (if applicable).

Not applicable

3.2. The Content of Studies and Implementation Thereof

3.2.1. Analysis of the content of the study programme. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators with the aims of the study course/ module and the aims and intended outcomes of the study programme. Assessment of the relevance of the content of the study courses/ modules and compliance with the needs of the relevant industry, labour market and with the trends in science on how and whether the content of the study courses/ modules is updated in line with the development trends of the relevant industry, labour market, and science.

Relevance of the content

Regulatory document: MK No. 141 "Regulations on the national standard of the first-level professional higher education"

Requirements	Study programme
The programme is between 80 and 120 credits.	80 CP
General educational courses - not less than 20 credit points.	20 CP
Branch-related courses - not less than 36 credits.	36 CP
Internship - not less than 16 credits.	16 CP
Qualification thesis - not less than 8 credit points, but not exceeding 10% of the total amount of the programme.	8 CP (10% of 80CP)
During the study process, no less than 30% of the volume of study courses is implemented practically.	During the study process, no less than 50% of the study course volume is implemented practically, taking into account that the contact hours are divided - 50% - lectures, 50% - practical work.

The mandatory content includes a module for the formation of entrepreneurship professional competences (organization and establishment of companies, management methods, basics of project development and management, record-keeping and financial accounting system, knowledge of the creation of social dialogue in society and the regulatory enactments of labor relations). Modules are included in all programmes in the amount of no less than 6 CP.	Business start-ups(4KP) Introduction to humanities (2CP) Project management (2CP) Modeling of business processes and prototyping of graphical interfaces (2CP)

A detailed overview and sequence of study courses are available in Annex 6.,7.

Regulatory document: occupational standard "Programmer" *(approved at the meeting of June 8, 2022, minutes No. 3)*

Comparing the occupational standard "Programmer" with the EC ESCO classification, in addition to the competences of "Programmer (2512 05)" (ESCO "2512.4 Software developer"), there are named requirements related to the occupational groups "2519 unclassified programmers and application developers and analysts " and " 2512 02 Programming ENGINEER".

ESCO “2512.2 Software analyst”:

- ability to create design decomposition to a lower level, creating descriptions of data and processes;
- ability to analyze various technical solutions and choose the most suitable one.

ESCO “2519.3 ICT change and configuration manager”:

- basic principles of software development (DevOps). Best practice in managing continuous integration and unceasing delivery (CI/CD). Ability to participate in software maintenance processes (DevOps).

ESCO “2519.7 Software tester”:

- ability to prepare software tests, choosing the most suitable design techniques and data for testing;
- ability to run software tests and log information about incidents/problems;
- ability to analyze software test results and perform analysis of identified discrepancies.

Taking this into account, the number of hours for the "Software Engineering" study course, which include topics on architectures, DevOps, SDD development, system analysis, design and modeling, has been increased in the programme, but students must additionally develop SDD in the qualification work. Data modeling and design elements were included in the course "Algorithms and Data Structures" and "Object Oriented Modeling and Programming", where students are given knowledge of UML and ER notations that they draw and implement in the .Net environment. On the other hand, the course "Programming II", which included the C# language and WinForms development, was updated, supplementing it with the theory and practical part of testing, changing the name to "Introduction to application programming and testing". Testing elements such as a performance test and OWASP were included in the course "Web Technologies III". The material is presented as a best practice, explaining to students how to implement the system from a testing perspective in the most effective way.

"Programming I" course) was integrated into the "Algorithms and Data Structures" course. As a result, students learn programming through designing and developing algorithms, later analyzing the speed of the solution. Despite the fact that the basics of programming is included in high school

curricula, the analysis of the real situation shows that most of the new students either cannot programme or have very poor programming knowledge.

It should be noted that the demand for several mathematical disciplines remains in the standard. In order to concentrate the material, the practical things necessary for the programmer were taken from each discipline, combining them under the name "Mathematics for software engineering".

A requirement for a second foreign language also appeared in the new standard, so "German" appeared in the mandatory content. Considering that nowadays, in Latvia, young people start learning English from the first grade in elementary school, professional English is learned by working in an English-speaking environment. The course "Computer networks" is taught in English, English terms are presented and used during lectures, development environments are configured in the English language, code commenting and system design are done in English, etc.

For detailed information on compliance of study courses with the standard, see Annex 4.

Relevance of the content

Labor market

According to the forecast of "*The Future of Jobs report of the World Economic Forum (2020)*" until 2025, the greatest demand growth in the sector "Digital Communications and Information Technology" will be for the occupations as follows (in order of priority):

1. AI and Machine Learning Specialists; 2. Data Analysts and Scientists; 3. Big Data Specialists; 4. Information Security Analysts;	5. Process Automation Specialists; 6. Digital Marketing and Strategy Specialists; **7. Software and Applications Developers.**

The software developer remains in the top 10 leaderboard. Knowledge and skills in areas such as data science, artificial intelligence, big data, digital marketing, advanced cyber security and the Internet of things can be acquired by graduates at the next levels of bachelor's and master's studies, thus motivating them to continue learning, providing continuity and new materials that do not overlap with the short cycle study programmes and generally increasing the competitiveness of the programmes. On the other hand, the short-cycle study programme provides theoretical and practical foundations, focusing on programming and software development.

The ocupational standard "Programmers" was developed in 2022 on the initiative of LIKTA and representatives of such IT companies as AS "Mapon", AS "Emergn", SIA "FITA", SIA "S-TEC Latvia" and AS "4finance" participated in its development.

At the European level, the professional competence requirements are available in the ESCO occupation "2512.2 Software Developer" description, where "Essential Knowledge, Skills and Competences" are defined conceptually, while programming language and tools are in the category of "Optional Knowledge". The occupational standard in Latvia includes the mandatory requirements of ESCO 2512.2, but does not provide a list of languages and technologies even in an optional form. According to ESCO 2512.2, web technologies can also be found in the technology block.

The 2021 ESSA report *“A Software Skills Strategy for Europe: Europe's Most Needed Software Roles and Skills”* provides a summary of the technologies in demand. If you compare the *ESSA* list of skills and the "Programmer" requirements, the standard includes all the roles of the ESSA *group* "*Hard and profession-related skills*"*: 1) Developer; 2) Solution designer; 3) Test specialist; 4) DevOps expert; 5) Digital media specialist*. Therefore, all of them will be covered below:

- Most often, a *Developer* must know a programming language. The most frequently mentioned are SQL and Javascript (30% of vacancies), HTML, GIT, CSS (25%), Java, C#, React (20%), and Python, PHP (10%).
- *Solution Designer* – SQL (25%), Microsoft & cloud (20%), & Javascript, HTML (15%). Some specific platforms (e.g.Azure (10%), .NET (7%)).
- *Test specialist* - Selenium (18%), Jira (16%) and SQL (15%). Python, Java, REST (11%) and .NET (7%). Keywords "tools" (41%), "automation" (30%), and "security" (15%).
- *DevOps experts* - Linux and Docker (30%), Kubernetes and Jenkins (25%) and Ansible (19%). Python is the most common language (27%).

When it comes to the local labor market, the technologies used by students during their professional internship were taken into account. RTA students mostly worked with web technologies: ASP .NET MVC and Entity Framework (.Net) or Django/Odoo (Python), which influenced the decision to replace the "Programming I and II" classes in C++ and WinForms development with web technologies "Web Technologies I, II and III".

"Web technologies I" provides knowledge of Front-end development (HTML, CSS, JS, jQuery, Ajax, Bootstrap, Vue.js, React), but as a part of the "Web Technologies II" course, students learn ASP .NET MVC and Entity Framework, both the Back-end part and the principles of connection with the Front-end. Similarly, the study course "Web Technologies III" includes Python and Django. PHP and Laravel, namely 'Web Technologies IV' are listed as electives.

When updating the programme, advice from employers participating in the evaluation of qualification works is taken into consideration. In addition, RTA organizes meetings and discussions with employers, updating information on required technologies and employers' recommendations or requests. For example, the program included the study course "Business process modeling and graphical interface modeling", which provides knowledge of production processes so that developers can communicate with customers, as well as *Start-Up* and *Canvas Models*, which teach students to generate business ideas by developing a prototype of a digital solution.

Science

RTA Institute of Engineering mainly deals with applied research. Students of the study programme are usually involved in the development of prototypes such as web app, mobile app, hybrid solutions or cyber-physical solutions where artificial intelligence is integrated. RTA research group most commonly uses technologies such as Python+Django and Java+Android in the development of prototypes that are compatible with the study programme. Students are provided with the course "Fundamentals of Scientific Research" and have the opportunity to participate in the student scientific conference held by RTA in spring. Graduates can enroll in the "Programming Engineer" programme, which provides more intensive involvement in science and provides knowledge and skills in advanced technologies such as artificial intelligence.

According to "KETs for Europe's technological sovereignty", students are involved in the directions as follows:

- Advanced manufacturing;
- Life-science technologies;
- Artificial intelligence.

Examples of projects:

• lzp-2020/2-0115 "E-mentor as a transformation tool for ensuring zero-waste food consumption in educational institutions";

• lzp-2019/1-0094 "lzp-2019/1-0094 Application of deep machine learning and data mining for the

study of plant-pathogen interactions: apple and pear scab pathosystems".

3.2.2. In the case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels (if applicable).

Not applicable

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is implemented in a foreign language or in the form of distance learning, describe in detail the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

Implementation of the programme

General description

The content of the study course is learned in lectures and practical classes. 40 hours are planned for obtaining 1 credit point (1 CP = 1.5 ECTS) of the study course, including 16 contact hours (lectures, practical work or seminars) in the auditorium or computer room. More than 50% of the classes are hands-on, with an emphasis on programming and app development. Each study course description indicates the type of testing– an exam or a test, independent work and evaluation system. For descriptions of study courses, see Annex 7.

The accredited programme "Programming and Computer Network Administration" included two modules: "Programmer" and "Computer Network Administrator". Due to low demand for the "Computer network administrator" module and strengthening the continuity of the course, it was decided to leave only one module - "Programmer", which could be maximally coordinated with the "Programming engineer" study programme.

The opportunity to implement up to 50% of the contact hours in the form of remote studies is welcomed in the study programme. The platform used for basic remote studies is MS Teams, which allows sharing materials, provides chatting opportunities and the ability to record videos. A backup option is Google Meet, which is more often used for consultations because it can be scheduled in Google Calendar. For a long time, the ICT department has been using the Moodle system, where teaching materials are placed and students' individual works are received. Considering that the availability of a computer for students and lecturers is an integral part due to the specifics of the profession, distance studies do not cause any problems. The specifics of the profession also allow for screen sharing to demonstrate software development during hands-on classes.

Languages

The study programme "Programming and computer network administration" is implemented only in Latvian. However, due to the specifics of the industry, communication in English takes place on several levels. For example, students are taught to follow good software development style and write in English when developing a software code, graphical interfaces, performing system design, preparing documentation in version control systems, etc. In Latvia, IT specialists often use English terms in mutual communication instead of Latvian, so during classes lecturers provide translations of terms and use the "slang" of programmers. The developers' documentation and the latest training materials are only in English, which are used during the course. The course "Computer Networks" is taught in English and is based on an official Cisco course and Cisco materials. The software in the computer classrooms is basically installed with English language settings. In addition, students have the opportunity to use the Erasmus+ exchange programme. There is no separate English course as the schools provide intensive English language training from grades 1 to 12, so the emphasis is on industry communication. Students who have weak knowledge of English, grammar and the basics of language can receive support at the RTA Lifelong Learning Center. The course "German language" has been added to the study programme, because the current occupational standard "Programmer" requires knowledge of two foreign languages. All RTA students can attend free Chinese language courses at the RTA Lifelong Learning Center.

The structure of the study programme

Students start to develop the topics, ideas and drafts of the qualification work already in the 1st semester, following the principles of the Start-Up methodology and developing a Minimum Viable Product (MVP), applying business-oriented principles throughout the study process.

1st semester "Business process modeling and graphical interface prototyping"	In the course, students are introduced to production processes and operations, and business process modeling tools in order to be able to provide customer-oriented solutions. Using prototyping tools, they sketch out an app designed to meet the customer's needs. They design their ideas through Project Canvas and Business Model Canvas, preparing a project vision to launch a Start-Up.
2nd semester "Software Engineering I"	Based on the prototype developed in the previous semester, students are trained to develop software requirements specification and software design description.
2nd semester "Project management"	Based on the prototype developed in the previous semester, students prepare a project plan, assess project risks and develop a detailed budget plan.

2nd-3rd semester "Web technologies I-III" 3rd semester "Mobile Apps"	Students learn web app development technologies and mobile apps to bring their ideas to life and finalize them in the qualification work. "Web technologies I" provides knowledge in front-end development: HTML, CSS, JS, jQuery and in the frameworks such as React, Vue.js, Bootstrap. "Web technologies II and III" provides knowledge in back-end development. Two branches were chosen as mandatory – C#/ASP.NET MVC+Entity Framework and Python/Django. “Mobile apps” – development of Android apps.

Internal regulations

Students have a separate profile in the RTA DVS, where they can access internal procedure documents such as "Internship Regulations", "Regulations on study course exams and tests", "Regulations on scholarships", etc. DVS also contains methodological instructions for the development of internship reports and diploma projects of each study programme. Each student is also provided with a supervisor during internship and qualification work, who introduces the student to methodological guidelines and monitors their implementation. In order to standardize the requirements for all programmes, RTA has developed "Methodological guidelines for the development and defense of study research papers at Rezekne Academy of Technologies". The RTA student self-government also offers support providing mentor - counsellor who is the senior year student. Lecturers have wider access to DVS, which also includes documentation related to the lecturer, such as "Regulations on academic positions at Rezekne Academy of Technologies (RTA)", "Regulations on lecturers of Rezekne Academy of Technologies ", etc. DVS forms a united communication ecosystem lecturer-student-RTA.

Principles of a student-centered approach

Ecosystem

The principles of student-centered education in the study programme are ensured, first of all, by evaluating the students' previous preparedness and offering the study content which can ensure the achievement of the study outcomes of the study programme in the most successful way. Secondly, RTA offers flexible study paths, including taking into account students' employment during studies, planning classes at convenient time for students. Thirdly, students are provided with full advisory support and full access to study resources (including those available remotely) necessary for achieving study outcomes. Fourthly, the study and research activities of students are aimed at the growth of their personality, including promoting the formation of their personality and motivating them for further studies. Fifthly, students are provided with feedback on the evaluation of their study results, which allows them to independently plan the course of their studies and the best ways to achieve their study outcomes.

Staff motivation

In order to enliven the implementation of the student-centered study process and motivate the staff, appropriate criteria have been incorporated into the academic staff self-evaluation, which are defined in the Rector's decree No. 4.20/63 "Procedure for evaluation of the quality of work done by the academic staff of Rezekne Academy of Technologies (RTA)". To sum up, the following categories are provided: 1) student support in the development of scientific publications and participation in conferences; 2) student support in competitions; 3) provision of problem-based studies.

Quality control

Based on the "RTA quality management policy principles", following the "Regulation on organizing surveys at Rezekne Academy of Technologies (RTA)", student questionnaires are conducted at least twice a year - at the end of each study semester. The survey is conducted anonymously, allowing students to give an assessment of each course studied during the semester and side factors as a material and technical basis. Survey results are stored in DVS for 6 years. The study department conducts a graduate survey, while the study process specialists of the faculty conduct a survey of employers.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the study programme is implemented in a foreign language, provide information on how internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

Internship opportunities and support

The study programme "Programming and computer network administration" includes two internships "Internship I" (4 CP, 4 weeks) and "Internship II" (12 CP, 12 weeks). During the internship, students develop new software, improve the existing software or deal with its maintenance (e.g. a bug fix).

The internship period is divided into two parts, the first internship is only 4 weeks, which allows the student to change the place of internship if the need arises. It also allows students to better understand the internship process as a whole. Each internship is defended separately, which requires preparation of a presentation and internship report. The development of internship reports ensures the acquisition of soft skills such as presentation skills, public speaking, argumentation of opinion, creative expression, etc. Internship allows students to learn about labor relations and organization of work in companies.

Each student has 2 internship supervisors: one from RTA, the other one from the company. RTA has concluded basic agreements with internship providers, however, students can choose the place of internship themselves. The place of internship, including foreign companies, is initially chosen by the student himself, in case of need, the student is provided with the help of the Faculty of Engineering and the Department of external relations of RTA in finding the place of internship. Such an approach builds students' skills to look for a job, have a successful interview and position themselves in the labor market, as well as consider future career opportunities and self-development directions. In addition, students can use the opportunity to turn to RTA Student Self-Government mentors (senior year students) to exchange experience and receive recommendations.

Internships in Rezekne are provided by such companies as SIA "Midis", SIA "Entrypoint", SIA "Laileo Software", SIA "Wunder Latvia". Starting from 2021 SIA "Geidans Solutions" provides 2 internships for RTA students throughout the year. The largest number of internships is provided by SIA "Midis". It should be noted that the interns are mostly engaged in the development of web application.

Before the Covid-19 pandemic, it was also possible to do an internship at SIA "Microlines" and SIA "Soaphog". However, the Covid-19 pandemic also opened up positive opportunities for RTA

students - Riga IT companies became much more open to the remote internship model used by students of the "Programming Engineer" study programme. For example, in neighboring cities, students can find internships in companies such as "Scandiweb" (Jēkabpils) and "TestDevLab" (Daugavpils).

Internships are also provided by RTA, but such internships are usually practiced by students who are involved in scientific or other RTA projects.

The programme director organizes a briefing about internships and informs twice about internship companies: the first time is at the end of the first academic year before summer holidays and the second time is at the beginning of the autumn semester of the second year. If the student needs some help in finding the internship company, he can also individually approach the programme director or RTA internship supervisor.

Description of internships

Students mostly fall into two categories: 1) students who want to work in an IT company in the future; 2) students who came to improve their qualifications in information technology.

Students who want to work in software development companies mostly do internships in SIA "Midis", SIA "Entrypoint" and SIA "Laileo Software".

Working students mostly do internships at their place of work if their goal is to improve their qualifications rather than change their place of work. Such examples include internships at "Institute of Electronics and Computer Science", SIA "Ceram Optec" or SIA "Līv Met". Sometimes, NoIT companies turn to RTA for help in developing information systems for them, examples of which are SIA "Refood", SIA "Crystal Rose" and SIA "Rezeknes Satiksme". It can also be seen when analyzing the workplaces of graduates (see chapter 3.1.3).

Software development companies	Other places of internship
SIA “MIDIS” SIA “Laileo Sofware” SIA “Entrypoint” SIA “IT PRO Solutions” SIA “Kleintech Sofware” IK “Aleksale”	Municipality of Ludza county Institute of Electronics and Computer Science Livani Secondary school no.2 SIA “Ceram Optec” SIA “Līv Met” SIA “Refood” SIA “Crystal Rose” SIA “Rēzeknes satiksme” Association "Baltā māja" Dricani secondary school Municipality of Balvi county Municipality of Alūksne county

Despite the fact that students of "Programming and computer network administration" programme have the opportunity to do an internship abroad through the Erasmus+ exchange programme, they have not used such an opportunity. The reason is too short period of studies (2 years including the development of a qualification thesis), and the fact that the programme is attractive to already working students, who are often adults with family obligations.

Connecting internship tasks with the study programme

The purpose of the programme is to prepare specialists in accordance with the national occupational standard "Programmer". The current version of the occupational standard provides for much broader requirements including testing, modeling and design skills. Before starting the internship, the student acquires all the training courses. The student is provided with knowledge of the most requested technologies in the local and international market (see chapter 3.1.3). The current study plan is reinforced in the field of web technologies, which is most often requested by internships and employers, taking into account discussions with them and previous years' experience. In addition, the students receive Start-Up skills that allow them to start their own business, manage the development of a separate product in the company or implement innovations or improvements in their company in the field of digitization and automation.

Internship for foreign students

Study programme does not provide eduction in English. Therefore, there is not requirement to provide internship for foreign students.

3.2.5. Evaluation and description of the promotion opportunities and the promotion process provided to the students of the doctoral study programme (if applicable).

Not applicable.

3.2.6. Analysis and assessment of the topics of the final theses of the students, their relevance in the respective field, including the labour market, and the marks of the final theses.

At the end of the study programme, a qualification work is planned. The qualification work involves developing software as a mobile app, web app, workbench app, hybrid solution or *cross-platform* solution. The qualification work consists of: 1) developed software (includes testing); 2) documentation of software requirement analysis (software requirements specifications, user stories or game design); 3) description of software design; 4) user manual; 5) presentations and video demonstrations of the project.

Previously, students were not required to write an SDD. This requirement has been introduced in accordance with the changes in the occupational standard. A video demonstration recommended by the final examination committee is also an innovation.

See 3.2.6.1. in the table. All qualification papers can be divided into seven categories:

1) the project has been developed at the request of the IT company where the student works. For example, SIA "Midis" and SIA "EntryPoint".

2) students develop systems within the RTA scientific projects. E.g. Aproject lzp-2019/1-0094, project lzp-2020/2-0115.

3) students develop a system for the purposes of a private farm.

4) students develop systems for the company they work for.

5) students develop systems to companies that sought RTA’s support.

6) students who develop systems for RTA's internal needs.

7) students develop systems to demonstrate their programming skills.

Taking into account that the duration of the study programme is two years long, the training courses last for less than three semesters and many students are admitted without the basics of programming. The qualification work provides only the requirements to demonstrate skills, abilities and competences according to the occupational standard. However, students are motivated to develop systems taking into account current problems in order to increase their competitiveness and develop problem-based thinking in the field of digitization and automation.

The composition of the final examination commission is regulated by the "Regulations on study course exams and tests at Rezekne Academy of Technologies (RTA)", according to which the chairman and at least half of the commission's composition are representatives of professional organizations or employers in IT field. The chairman or vice-chairman of the commission must have a doctor's degree in the relevant industry, the members of the commission must have at least a master's degree or must be specialists with higher education who have been working in a leading position in the relevant industry for at least 3 years.

Before allowing the student to defend the qualification thesis, a qualification thesis development schedule is prepared every year, according to which students must report to their supervisors and submit a part of the thesis. Before the defense, students are provided with pre-defense meetings, where students present their work and commission provide recommendations for improving the presentation.

The new qualification thesis development model provides that students start developing their qualification thesis topics already in the 1st semester. Later, this model may be improved by assigning research topics and real problems to students, providing problem-based education throughout the learning cycle.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (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 the learning outcomes to be achieved by providing the respective examples.

Development technologies

The main emphasis is placed on web technologies:

- front-end: HTML, CSS, JS, jQuery, Bootstrap, React, Vue.js;
- back-end: 1) Python+Django; 2) C#+ASP.NET MVC/Entity Framework.

Basics of programming (express material): C++/C#/Python and MS Windows Forms.

Mobile App Development: Android+Java, an insight in Kotline

Game Development: C#+Unity

Databases: MS SQL, MariaDB, SQLite

Requirements engineering and design: umletino, Enterprise Architect, Axure/Figma, ninjamock/balsamiq, draw.io/bpmn.io, Project Canvas, Business Model Canvas, miro

Project management: Atlassian Jira, Confluence, Trello, Kanban, Google/Microsoft document software, GIT, GitHub/Bitbucket.

Information facilities:

Considering the specifics of the Programmer's profession, lecturers intensively use learning materials, knowledge sites, documentation offered by technology developers, e.g. Microsoft developer documentation, Google developer documentation, Django documentation, Cisco Academy courses, etc. In this way, students not only learn to work with developer’s documentation, but also get access to the latest materials that may not even be available in a book form.

Science facilities:

In the study programme "Programming", emphasis is put on the acquisition of professional skills in the field of software development, which enables students to provide support in applied research by developing software prototypes. Level 1 students are more involved in scientific projects, research or grants as programmers who develop smart solutions, transferring researchers' ideas to the user level. Graduates, on the other hand, can continue their studies in the "Programming Engineer" programme, which provides practical knowledge in artificial intelligence, data science, and the Internet of Things.

3.3.2. Assessment of the study provision and scientific base support, including the resources provided within the framework of cooperation with other science institutes and higher education institutions (applicable to doctoral study programmes) (if applicable).

Not applicable.

3.3.3. Indicate data on the available funding for the corresponding study programme, its funding sources and their use for the development of the study programme. Provide information on the costs per one student within this study programme, indicating the items included in the cost calculation and the percentage distribution of funding between the specified items. The minimum number of students in the study programme in order to ensure the profitability of the study programme (indicating separately the information on each language, type and form of the study programme implementation).

Information on the financing of the study programme "Programming" (including, by years in the reporting period) and its sources is viewed in detail in the criterion 2.3.1.

RTA calculations suggest that the direct costs of the first level professional higher education study

programme "Programming" (remuneration of academic and general staff) are 1833.87 EUR/ 75% per one reference student a year, the indirect costs (expenses for ensuring RTA activities, including library, immovable property tax, rent of premises, operating expenses of buildings and equipment, telephone subscription and service costs, utilities, current repairs, special programmes, etc.) are 611.29 EUR/ 25% per one reference student a year. In general, the tuition costs for one full-time student are estimated at 2445.17 EUR per year, which does not exceed the costs in European states for the training of one student in a similar speciality.

The procedure for planning and recording the workload of academic staff at the RTA determines that the minimum number of students in a group for full-time studies in LKI level 5, 6, and 7 programs is 7.

Funding of the study programme "Programming"

Financial year	2017	2018	2019	2020	2021	2022
Minimum Ratio of Study Costs:	1,5	1,5	1,5	1,5	1,5	1,5
Ratio of Study Level:	1	1	1	1	1	1
Basic Costs of Studies (euro)	1393,22	1458,51	1518,98	1525,64	1630,11	1630,11
Amount of scholarship (euro)	150,82	150,82	150,82	150,82	200,00	251,98
Sports, culture, student hostel (euro)	13,52	13,52	13,52	13,52	13,52	13,52

The number of state-budget funded study places	18	27	36	36	36	36
The number of state-budget funded study places	40575	63507	87941	88301	95713	97584

3.4. Teaching Staff

3.4.1. Assessment of the compliance of the qualification of the teaching staff members (academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants) involved in the implementation of the study programme with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments. Provide information on how the qualification of the teaching staff members contributes to the achievement of the learning outcomes.

21 lecturers are involved in implementation of the study programme. 15 lecturers (71%) out of 21 are elected to the academic and/or scientific position at RTA, 6 (29%)arēj non-elected at RTA. 9 (43%) lecturers have a doctoral degree; 9 of them are RTA elected.

Distribution of elected lecturers of the study programme Programming and Computer Network Administration by positions:

- Professors- 3 (including, RTA-elected leading researchers- 1);
- Assoc. Professors- 4 (including, RTA-elected leading researchers- 3);
- Assistant professors – 1 (including, RTA-elected leading researchers- 1);
- Lecturers -6 (including, RTA-elected researchers- 2; scientific assistants - 1);

Distribution of RTA visiting lecturers by positions:

- Visiting assistant professor – 1 (including, RTA-elected researcher- 1);
- Visiting lecturers - 6.

For full information about study programme lecturers and their publications see Annex 14 and for the lecturers' CVs – Annex 10. For certification of the official language knowledge of the teaching staff of the study programme see Annex 11.

Lecturers-practitioners with extensive professional work experience in the field are involved in the implementation of study programme (see criterion 2.3.6 of the Chapter 2). The qualification of the teaching staff fully complies with the requirements of the laws and regulations and ensures the achievement of the learning outcomes of the study programme.

3.4.2. Analysis and assessment of the changes to the composition of the teaching staff over the reporting period and their impact on the study quality.

Lecturers

Improvements took place both by increasing the competence of lecturers and by attracting new specialists and updating the generation of lecturers.

In terms of competence, lecturers are intensively engaged in the implementation of research projects:

Year	Project	Lecturers
2016-2018	Developing The Competence Center for Mechanical Engineering (1.2.1.1/16/A/003)	A.Teilāns
2018-2019	Laser processing optimization tool (KC-PI-2017/97)	A.Teilāns
2020-2022	LZP-2019/1-0094 Application of deep machine learning and data mining for the study of plant-pathogen interactions: apple and pear scab pathosystems	A.Teilāns, I.Zarembo, P.Grabusts, S.Kodors, I.Kangro, I.Apeināns
2020	VPP-COVID-2020/1-0009 ARTSS: Perspective technologies for sustainable and secure services	A.Teilāns, I.Zarembo, P.Grabusts, S.Kodors
2021	E-mentor as a transformation tool for ensuring zero-waste food consumption in educational institutions	S.Kodors, L.Litavniece
2022-2024	Development of a decision-making system for smart fruit cultivation using autonomous drones (No. lzp-2021/1-0134)	I.Zarembo, S.Kodors, L.Litavniece, I.Apeināns

Lecturers I.Kangro, M.Kijaško, L.Litavniece, P.Grabusts, S.Kodors and A.Teilāns were involved in competence enhancement activities within the project, "Strengthening the academic staff of the Rezekne Academy of Technologies in the study directions "Mechanics and metalworking, thermal energy, thermal engineering and mechanical engineering" and "Management, administration and real estate management", no. 8.2.2.0/18/A/016". Competence enhancement included improving

English language and leadership skills.

Staff changes: until AY 2021-2022 there were no significant staff changes, as RTA focused on the staff involved in scientific projects.

Significant staff changes were in AY 2021-2022. The lecturer Dr.sc.ing doc. Imants Zarembo was invited to implement the study course "Project Management", replacing Dr.sc.ing. prof. A. Teilāns. The decision was made in the result of strategic planning, which envisaged to renew the generation of lecturers and increase the number of staff. A. Teilāns moved to the position of the dean and became more prominent in science. On the other hand, I. Zarembo not only leads RTA IT scientific projects, but is a representative of the industry, working at AS "Printfull Latvia". Previously he was a member of the board at the computer game development company SIA "Soaphog". In AY 2021-2022 a doctoral student Mg.sc.comp. Ilmārs Apeināns joined the RTA staff. He has been working on RTA scientific projects since his bachelor's studies, fulfilling the duties of a programmer, implementing mobile and web apps, integrating and training artificial intelligence. I.Apeināns has prepared and delivers the course "Web technologies I", which involves front-end development. With AY 2022-2023 I.Apeināns delivers the course "Web Technologies II", which involves back-end development in the .NET environment (ASP.MVC and Entity Framework). I. Apeinān's courses are based on Dr.sc.ing. S. Kodor's course "Development and use of content management systems", strategically/gradually replacing and updating staff, as well as coming in line with the tasks of career growth.

In AY 2022-2023 modernization of the programme continues by including the course "Business process modeling and graphic interface prototyping" according to the plan, and in accordance with the employers' request to strengthen students' knowledge in entrepreneurship and production processes. Dr.oec Lienīte Litavniece, who is not only engaged in project development and management, but is also a practicing entrepreneur (SIA "Safīra L") and a member of the Latgale Regional Council of the Latvian Chamber of Commerce and Industry (LCCI), which is the largest business association in Latvia and has nearly 6,000 members (3,000 individual companies and 3,000 business associations), was invited to join the team. The aim of the course is also to give Start-Up skills, so students have to design a business-oriented idea in an app prototype. Dr.sc.ing I. Zarembo, who had specialized in creating app prototypes while working in IT companies, was engaged to deliver classes in prototyping. On the other hand, S. Kodors teaches requirements engineering and business process modeling tools, transferring experience from projects to the implementation of contractual research and work with clients (customers of computer software prototypes).

In the spring of 2022, a new standard "Programmer" was approved. The standard provided for significant changes in the competence of programmers, including design and modeling. As a result, RTA administration staff decided to harmonize the programmes "Programming and computer network administration" and "Programming engineer" so that after completing a 2-year programme, graduates could enter the 3rd year, continuing their studies at the bachelor's level. As a result, there was an integration of the "Programming Engineer" courses, as well as a new standard envisaged new requirements.

The course "Programming I" (5 CP, I. Meirāns), which covered the basics of programming, was replaced by the joint RTA course "Information and communication technologies" (3 CP, J. Musatovs and A. Zorins). A new occupational standard stipulated the requirement to include the theory of algorithms, so the "Programming Engineer" courses "Algorithms and Data Structures I/II" (3+2 CP) and "Theories of Algorithms" (1 CP) were combined into the course "Algorithms and Data Structures" (4 CP), including the fundamentals of programming, reducing the total number of CPs in the result of integrated material. The course "Programming II" (5 CP) was replaced by an alternative

"Programming engineers" course "Introduction to app application and testing" (3 CP), as the updated standard provides for greater emphasis on testing (as a result, Mg.sc.comp. J. Musatov was replaced by Mg.sc.comp. A. Zorins). On the other hand, the course "IT Standards" (2CP) was transferred to "Programming engineers", while the basic material (basics) is included in the courses "Information and communication technologies", "Optimization of business processes and prototyping of graphic interfaces", "Software engineering I, II". 4CP went to the courses "Web technologies I, II", delivered by Phd student I. Apeināns.

It is not possible to dispense with programming in the 1st year course, because the biggest part of the enrolled students does not know this material. In the future RTA Center for lifelong education is considered as a solution, when students with a low level of programming knowledge could take additional courses before their studies.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals or peer-reviewed monographs may be additionally specified. Information on the teaching staff included in the database of experts of the Latvian Council of Science in the relevant field of science (total number, name of the lecturer, field of science in which the teaching staff has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

Not applicable.

3.4.4. Information on the participation of the academic staff, involved in the implementation of the doctoral study programme, in scientific projects as project managers or prime contractors/ subproject managers/ leading researchers by specifying the name of the relevant project, as well as the source and the amount of the funding. Provide information on the reporting period (if applicable).

Not applicable.

3.4.5. Assessment of the cooperation between the teaching staff members by specifying the mechanisms used to promote the cooperation and ensure the interrelation between the study programme and study courses/ modules. Specify also the proportion of the number of the students and the teaching staff within the study programme (at the moment of the submission of the Self-Assessment Report).

Mutual cooperation evaluation

The basic cooperation model is developed by the programme director, based on the standard requirements of the occupation, current technologies, employers'demand, previous years' experience, available staff and the involvement of staff in projects. New models are coordinated with the Dean and the Head of direction.

Basic framework:

Year	Course	Description
1st semester	"Business process modeling and graphical interface prototyping"	As part of the course, students are introduced to production processes and problems faced by customers. Students are given examples of real companies. As a result, students need to come up with a *Minimum Viable Product* (MVP) that could support the manufacturer. Students design their project using *Start-Up* methodology - through *Project Canvas and Business Model Canvas.* Product requirements should be described in a use-case diagram and depicted as a business model of how the product will be used in the future, in the company, to support their tasks. Students need to design their idea in the form of a prototype.
2nd semester	"Software Engineering I"	Based on the materials of the course "Business Process Modeling and Graphical Interface Prototyping", students need to prepare software requirements specification and design.
2nd semester	"Project management"	Based on the materials of the course "Business Process Modeling and Graphical Interface Prototyping" and "Software Engineering I", students need to prepare a project plan, risk assessment and detailed budget.
3rd semester	"Web Technologies I and II", "Mobile App Development"	The courses envisige that students can realize their ideas as individual projects, which are taken into account in the evaluation system.

At the course level, the descriptions are prepared by lecturers based on their competence, trends in the field and topicality of technologies/methods/tools.

The study programme includes integrated courses taught by several lecturers together:

- "Business process modeling and graphic interface prototyping", L.Litavniece, I.Zarembo, S.Kodors;
- "Project management", L.Litavniece, I.Zarembo, V.Dubovskis.

Individual tasks are interrelated and the lecturers grade students together, taking into account the content of individual tasks.

Internship reports and defenses of qualification works are reviewed and assessed by supervisors under the programme director's guidance.

The teaching staff actively works in joint scientific projects (see chapter 3.4.2). One of the criteria in

the distribution of study courses, materials and technologies is the roles of lecturers in scientific projects and administrative positions at RTA.

The new model considers that students apply the individually developed project materials of the previous lectures in the next lectures gradually going to the qualification work. Previously, teaching staff was limited to their course. Therefore, mutual cooperation is evaluated with strong improvements.

The ratio of faculty to students

In November 2022 there are 42 full-time intramural students in the study programme and 21 lecturers, who have a total of 1174.7 contact hours, are involved in its implementation. The ratio of students and teaching staff in the study programme is viewed according to the methodology established by the OECD, dividing the full-time equivalent (FTE) of students in the programme (16.8) by the full-time equivalent FTE (0.8) of the teaching staff employed in the programme. At the time of submitting the self-assessment in 2022, the ratio of teaching staff to students is 21, which is higher than the average number for short-cycle programmes (14) in Latvia and the average of OECD countries (16), but it is close to the indicator of countries such as Denmark (23) (see Education et Glance, 2022, Table D8.1. Ratio of students to academic staff by tertiary level of education and type of institution (2020)).

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Annex 1.7z	1.pielikums.7z
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 2.docx	2.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 3.docx	3.pielikums.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 4.docx	4.pielikums.docx
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 5.xls	5.pielikums.xls
The curriculum of the study programme (for each type and form of the implementation of the study programme)	annex 6.docx	6.pielikums.docx
Descriptions of the study courses/ modules	Annex 7.7z	7.pielikums.7z
Description of the organisation of the internship of the students (if applicable)	Annex 8.docx	8.pielikums.docx
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Software engineer (42484)

Study field	*Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science*
ProcedureStudyProgram.Name	*Software engineer*
Education classification code	*42484*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Pēteris*
Surname of the study programme director	*Grabusts*
E-mail of the study programme director	*Peteris.Grabusts@rta.lv*
Title of the study programme director	*prof.esors, Dr.sc.ing.*
Phone of the study programme director	*26593165*
Goal of the study programme	*to provide training of highly qualified specialists in the field of software engineering, who will be ready to professionally join software development projects, adapt to the requirements of the labor market, as well as continue their education in the master's pogramme.*
Tasks of the study programme	*1. to acquire the knowledge of natural sciences, mathematics, information technology, basic sciences relevant to the industry and the theoretical basics of the industry necessary for the qualification of a programming engineer, to develop the ability to apply this knowledge;* *2. to ensure the acquisition of disciplines that allow to compete in the labor market;* *3. to develop the ability to define and solve problems specific to the information technology sector;* *4. to improve the skills of strategic and analytical thinking;* *5. to ensure the acquisition of project development, implementation and management skills;* *6. to develop abilities to work in a team of specialists;* *7. to develop knowledge of foreign languages, which would ensure the ability to cooperate with colleagues from other countries, work and continue studies abroad;* *8. to acquire an education providing a broad perspective and knowledge of professional ethics, which in turn would ensure an understanding of the impact of the implementation of industry projects on the environment and society;* *9. to develop skills necessary for lifelong learning.*

Results of the study programme	*Z1. Demonstrates the basic and specialized knowledge of the programmer's profession and a critical understanding of this knowledge. Knows industry standards, terminology, technologies and has the knowledge of information technology development trends.* *Z2. Demonstrates understanding of the most important concepts and regularities of the industry, has knowledge of analysis of knowledge systems and its practical application in the identification, development and maintenance of information systems architecture requirements.* *P1. Using the acquired theoretical basic knowledge and skills of the industry, is able to perform professional activities within the professional competence of a programmer.* *P2. Able to develop software systems according to functionality and resource requirements, implement and maintain software, prepare a testing plan, make necessary software changes and consult software users.* *K1. Able to obtain, analyze, evaluate and systematize information, find solutions to identified problems, learn the latest industry technologies.* *K2. Able to evaluate the impact of professional activity on the environment and society, demonstrate an understanding of professional ethics in the profession of a programmer and take part in the development of the industry.*
Final examination upon the completion of the study programme	*State examination, which includes the defense of the diploma project.*

Study programme forms

Full time studies - 4 years - latvian

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*160*
Admission requirements (in English)	*Secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Bachelor's Degree in Information Technology*
Qualification to be obtained (in english)	*Software engineer*

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

Full time studies - 4 years - english

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*0*
Language	*english*
Amount (CP)	*160*

Admission requirements (in English)	*Secondary education. English at least B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Bachelor's Degree in Information Technology*
Qualification to be obtained (in english)	*Software engineer*

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

3.1. Indicators Describing the Study Programme

3.1.1. Description and analysis of changes in the parameters of the study programme made since the issuance of the previous accreditation form of the study field or issuance of the study programme license, if the study programme is not included on the accreditation form of the study field, including changes planned within the evaluation procedure of the study field evaluation procedure.

Due to changes in the classification of education in Latvia, defined by the Cabinet of Ministers regulations no. 322 "Regulations on the Classification of Latvian Education" (approved on 13.06.2017), the study programme code was changed from 42481 to **42484**, which reinforces the compliance of the programme with the thematic group of Natural Science, Mathematics and Information Technology education, the thematic field of computer science education and the group of programming software.

On March 9, 2022, significant changes were approved for the study programme, setting **English** as the language of implementation. These changes were introduced due to the cooperation initiated by RTA with London Metropolitan University, which envisaged mutual recognition of study content and the opportunity for RTA students to continue their studies at Metropolitan University. For this purpose, in 2020, the external expertise of the RTA programme was carried out by Professor Rupert Ward of the University of Huddersfield, Tom Crick, Professor of Computer Science at Swansea University, Yvonne James, Senior Lecturer in IT at the University of Lincoln (see annex). Despite the fact that the experts supported the cooperation model between RTA and London Metropolitan University, unfortunately it has not yet been implemented in practice. It was affected by the crisis of attracting foreign students caused by Covid and the unfavorable financial conditions of cooperation for RTA. Currently, new solutions for attracting foreign students are being sought.

After the previous accreditation, significant changes have been made in the structure of the study programme to ensure compliance with the requirements of the occupational standard

The parameters of the study programme:

1.	Title of the study programme in Latvian	**“Programmēšanas inženieris”**
2.	Title of the study programme in English	*“Programming Engineer”*
3.	Code of the study programme according to the Latvian Education Classification	42484
4.	-	**-**
5.	Type of study programme	2nd level professional higher education study programme

6.	Qualification level to be acquired (NQF / EQF)	Fifth (5th) professional qualification level (corresponds to the sixth (6th) level of the Latvian qualifications framework (6th LQF))	
7.	Volume of the study programme (CP, ECTS also recommended)	240 ECTS	
8.	Form, type, duration and language of implementation		
	full-time studies	4 years	Latvian
9.	Implementation place	Rēzeknes Tehnoloģiju akadēmija, Atbrīvošanas aleja 115, Rēzekne, Latvija	
10.	Admission requirements	CE in Mathematics CE in Latvian CE in a foreign language * other persons other CE passed by a person for attainment of general secondary education.	
11.	The degree to be conferred, professional qualification or degree and professional qualification	Professional bachelor's degree in information technology and qualification of an engineer programmer.	
12.	Occupational standard, the year of its approval	Occupational standard "Programming engineer", minutes No. 5 of the meeting of June 17, 2009	
13.	The final examination at the end of the study program	State examination, which includes the defense of the diploma project.	
14.	Director of the study programme	Pēteris Grabusts, prof., Dr.sc.ing.	

The **goal** of the second-level higher professional education study programme "Engineer of Programming" is to provide training of highly qualified specialists in the field of software engineering, who will be ready to professionally join software development projects, adapt to the requirements of the labor market, as well as continue their education in the master's pogramme.

To achieve the goal, the following **tasks** have been set:

- to acquire the knowledge of natural sciences, mathematics, information technology, basic sciences relevant to the industry and the theoretical basics of the industry necessary for the qualification of a programming engineer, to develop the ability to apply this knowledge;
- to ensure the acquisition of disciplines that allow to compete in the labor market;
- to develop the ability to define and solve problems specific to the information technology sector;
- to improve the skills of strategic and analytical thinking;
- to ensure the acquisition of project development, implementation and management skills;
- to develop abilities to work in a team of specialists;
- to develop knowledge of foreign languages, which would ensure the ability to cooperate with

colleagues from other countries, work and continue studies abroad;
- to acquire an education providing a broad perspective and knowledge of professional ethics, which in turn would ensure an understanding of the impact of the implementation of industry projects on the environment and society;
- to develop skills necessary for lifelong learning.

The expected learning outcomes

Z1. Demonstrates the basic and specialized knowledge of the programmer's profession and a critical understanding of this knowledge. Knows industry standards, terminology, technologies and has the knowledge of information technology development trends.

Z2. Demonstrates understanding of the most important concepts and regularities of the industry, has knowledge of analysis of knowledge systems and its practical application in the identification, development and maintenance of information systems architecture requirements.

P1. Using the acquired theoretical basic knowledge and skills of the industry, is able to perform professional activities within the professional competence of a programmer.

P2. Able to develop software systems according to functionality and resource requirements, implement and maintain software, prepare a testing plan, make necessary software changes and consult software users.

K1. Able to obtain, analyze, evaluate and systematize information, find solutions to identified problems, learn the latest industry technologies.

K2. Able to evaluate the impact of professional activity on the environment and society, demonstrate an understanding of professional ethics in the profession of a programmer and take part in the development of the industry.

Analysis of changes in study programme parameters

1) it has been decided to stop the implementation of the part-time extramural study form due to its low demand.

2) at the time of preparation of the accreditation materials, the occupational standard "Programming engineer" is valid in accordance with the meeting minutes No. 5 of June 17, 2009. The research on the compliance of the study programme with this standard, as well as with the project version of the standard of "Programming engineer", has been carried out is directed/coordinated by LIKTA for approval of the Ministry of Education and Culture.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree, professional qualification/professional qualification requirements or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

The title, aim, tasks, learning outcomes of the study programme “Programming engineer”, the obtained bachelor’s degree in information technology and the professional qualification of a programming engineer are interrelated. They fully correspond to the Latvian Qualifications

Framework (LQF), the European Qualifications Framework (EQF) and the professional standard of a Programming engineer which is still in the coordination stage at the time of the development of the self-assessment report. The structure of the study programme and the content of the study courses ensure achievement of all the learning outcomes.

The study programme typologically and in terms of its content corresponds to the educational thematic group of Natural sciences, mathematics and information technology (the component of the code 4), to the educational thematic area of Computer science (component of the code 48) and to the group of Programming (the component of the code 484) determined by the LQF.

The relevance of the study programme "Programming engineer" to the study direction has also been defined by Sectoral Expert Council (NEP) of the production of electronic and optical equipment and information and communication technologies of Employers' Confederation of Latvia (LDDK), since the qualification of Engineer of Programming obtained within SP is included in the profession map of the given sector. (see https://registri.visc.gov.lv/profizglitiba/dokumenti/nozkval/NKSK_elektron_un_ikt.pdf (only in Latvian).

The study program has been implemented since 2007 (license no. 04048-64). It is based on the higher professional education study programme "Software Engineer Programmer" launched in 1997 and accredited in 1999. Admission requirements have not changed during the last 5 years and are based on the results of centralized exams. According to the statistics of the Ministry of Education and Culture on the results of the **centralized exam in mathematics**, RTA with 43.9% shares the 6th place with Ventspils University of Applied Sciences among 23 higher education institutions that implement basic study programmes in the field of information technology.

In order to select the most suitable applicants that comply with the requirements of the industry, RTA awards additional points in the competition for national exams in Informatics, Physics, Chemistry and Natural Sciences. For example, from 2019 till 2022 32% of applicants who had taken exam in informatics passed it with a grade of 70%, 28% of applicants with a grade of 84%, 19% of applicants with a grade of 98%, 13% of applicants with a grade of 56% and only 4% of applicants with a grade of 42%. In the 4-year period, the average rating in informatics is 48.4%, which is a higher indicator compared to the data of 2018 (43.9%).

The volume of the study programme is 160 CP (240 ECTS), the duration of implementation is 4 years. During this time, the knowledge, skills and competences specified in the profession standard of a programming engineer can be fully acquired.

The final version of the professional standard “Engineer of programming” is planned to be agreed at the meeting of the National Tripartite Cooperation Council (NTCC) till December 2022.

The resources of the SP, lecturers’ qualification and English knowledge allow to implement the study programme in Latvian, as well as in English. The implementation of the SP in Latvian is necessary to prepare programming engineers mainly for the Latvian labour market, therefore it is funded mostly by the Latvian state budget. The implementation of the SP in English allows to attract additional funding (foreign students will pay tuition fees themselves), acquire new experience within the work with foreign students, which can be used to develop international cooperation.

3.1.3. Economic and/ or social substantiation of the study programme, analysis of graduates' employment.

According to the medium-term labor market forecasts of the Ministry of Economy, the shortage of programmers with higher education will reach 1627 by 2030. It is also predicted that by 2027, the common shortage of highly qualified specialists in natural sciences, ICT and engineering may grow to ~14 thousand. According to the data of the portal visidarbi.lv of 02.12.2022, the current demand in the industry consists of 107 announcements in the field of programming. 174 programming engineers have graduated from the programme since its foundation, 51 graduates during the reporting period.

In the academic year 2022-2023, 68 students are enrolled in the programme. 88% of them come from Latgale region, 8% - from other cultural and historical regions of Latvia, 3 or 4% are foreign students.

Economic and social rationale

Official national statistics

According to the "Macroeconomic Review of Latvia 2021" of the Ministry of Economy, the Covid-2019 crisis contributed to the increase in the unemployment rate, while at the same time it accelerated the digitization of the economy and the automation of jobs. The number of occupied jobs in the "Information and communication services" group increased by 1 thousand, which affects the stability of the profession in the labor market, accounting for 4% of the total number in the country. The export of ICT services accounts for 19% in 2020, sharing the first place with road transport. At the same time, the import of ICT services accounts for 11%, taking the first place, shared with travel services.

ICT sector indicators in Latvia

Forecasting demand for specialists

LV: According to the labor market forecast of the Ministry of Economy of Latvia until 2040, the shortage of employees in "Programming" group will reach 1627 by 2030, which is the 6th largest group from the top 20 list.

EU: According to "The European Software Skills Alliance (ESSA)" 2021 report: despite the increase of specialists, the shortage of ICT specialists remains relevant.

Globally: According to "*The Future of Jobs report of the World Economic Forum (2020)*" forecast until 2025, the group "*Software and Applications Developers*" ranks 9th in the list of the most in-demand professions, while "*AI and Machine Learning Specialists*" takes the 2nd place and is available to graduates who continue their studies in the bachelor's programme "Programming engineer", while the 1st level programme guarantees the necessary basic knowledge and skills.

Demand for ICT specialists

The State Employment Agency held an express survey of employers in 2022. It found that ICT services (90%) are needed even more often than average. ICT companies (45%) used state support for employee training more often than average. A third (33%) of the employers' companies/institutions have budgeted expenses for training. More often, the training budget is intended for information and communication service (54%) sectors. Employers in Latgale (75%) more often expect professional skills from their employees, but in Riga (60%) these skills are required less often than average. From a regional point of view, companies in Latgale (50%) plan to use state support more often than average.

The data show that there is a shortage of software developers in the labor market both in Latvia,

the EU and the world. Current forecasts show that the demand will only increase in the coming years. Latgale employers are especially dependent on state support, taking into account the demand for higher education specialists.

Graduate employment

At the university level

According to the report of the Ministry of Education and Culture "Employment of graduates of higher education institutions in 2019", around 88% of graduates of higher education institutions were employed in 2019. The employment rate of RTA graduates in highly qualified professions is 79%, which is equal to Daugavpils University, which is the second HEI of Latgale region, but the number is lower than the average of 83%. However, it should be taken into account that the number of unemployed in Latgale is more than twice as high as the national average, and almost 3 times higher than in the Riga region (report of the Ministry of Economy 2022), which is related to the lack of vacancies in the region. The number of unemployed people in the Latgale region in 2020 was 15.4%. Summing up, the difference of 2% in highly qualified professions even indicates the significant positive impact of HEIs on society and their well-being in the region - higher education allows graduates to be employed and competitive. It should be noted that the difference from RTU and UL is only 4% and 7%, respectively, considering that both HEIs are located in a more favorable region in terms of the number of job vacancies and salary.

At the level of study programmes

According to SEA data, all 2018-2021 graduates are employed (data selected on 29.11.2022). Two graduates were unemployed in 2022, which is probably also related to the impact of Covid-19.

Employment in IT companies

Graduates of the study programme work in such software development companies as SIA "Midis", SIA "Lailio Solutions", SIA "Entrypoint", SIA "TestDevLab" and SIA "Geidans Solutions Latvia", etc.

Conclusions

Disregarding the period of the Covid-2019 crisis, almost all graduates of the study programme are employed, despite the fact that the Latgale region has the highest unemployment rate in the country, which is 15.4% for 2022.

3.1.4. Statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down into different study forms, types, and languages.

The study programme Engineer of Programming has been implemented since 2007. The study process is organized only as full-time studies in Latvian. For foreign students of Erasmus+, classes are organised in a separate group in English or together with a Latvian group in English (or bilingually). Studies are carried out at the expense of the state budget and for tuition. For information about the students of the programme, see Annex 2.

Out of the number of students matriculated in the 1st year, 39% of the students complete the programme. The main reasons for students' ex-matriculation are poor progress, expiration of the

student exchange program agreement (foreign students through ERASMUS +), non-compliance with the requirements set during the study process (for example, fail to start studies at all, do not sign a study agreement,) or at own will. Most students who have been expelled due to unsatisfactory evaluation, have the required abilities to complete the study programme successfully; many of these people work in IT field and are unable to combine work with the study process. A large part of students (43% of all exmatriculated) who have been expelled due to unsatisfactory evaluation have completed the majority of study courses but have not developed and defended their diploma project. Such students to re-establish themselves in the study programme after one or a few years and complete it.

3.1.5. Substantiation of the development of the joint study programme and description and evaluation of the choice of partner universities, including information on the development and implementation of the joint study programme (if applicable).

Not applicable.

3.2. The Content of Studies and Implementation Thereof

3.2.1. Analysis of the content of the study programme. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators with the aims of the study course/ module and the aims and intended outcomes of the study programme. Assessment of the relevance of the content of the study courses/ modules and compliance with the needs of the relevant industry, labour market and with the trends in science on how and whether the content of the study courses/ modules is updated in line with the development trends of the relevant industry, labour market, and science.

Relevance of the content

Regulatory document: Regulations of the Cabinet of Ministers of August 26, 2014 No. 512 "*Regulations on the national standard of second-level professional higher education*" https://likumi.lv/doc.php?id=268761(only in Latvian)

Requirements

Stipulated in the standard	Indicators of the study programme

The goal of the study programme	- to educate students, ensuring the acquisition of the fifth level professional qualification, as well as to promote their competitiveness in changing socio-economic conditions and the international labor market; - to ensure the achievement of learning outcomes (knowledge, skills and competences) in accordance with the 6^{th} and 7^{th} level knowledge, skills and competence of the European qualification framework (hereinafter referred to as the framework) defined in the Latvian education classification.	Accomplished
The expected results of the study programme	The content of the bachelor's programme provides a set of knowledge, skills and competence in accordance with the 6th level knowledge, skills and competence defined in the Latvian education classification.	Accomplished
Volume of the study programme (CP)	The volume of the bachelor's programme is at least 160 credits.	160 CP
The length of the study programme	According to the regulations of the Cabinet of Ministers No. 240, the volume of the bachelor's study programme in full-time and part-time studies is 120 to 160 credit points. The length of full-time studies is six to eight semesters.	8 semesters

Parts of the programmes and their volume (mandatory, limited electives, electives), including the volume of the final thesis, indicating the titles of specific study courses and CP.	The mandatory content of the bachelor's programme consists of: - general study courses in the amount of at least 20 credit points - theoretical basic courses of the industry (professional activity areas) and information technology courses in the amount of at least 36 credit points - professional specialization courses (professional activity areas) in the amount of at least 60 credit points. - elective courses in the amount of at least 6 credit points -internship in the amount of at least 20 credit points -state examination, which includes the development and defense of a bachelor's thesis or diploma thesis (diploma project), in the amount of at least 12 credit points -during the acquisition of the bachelor's programme, the student develops and defends at least 3 study papers	20 CP 36 CP 60 CP 8 CP 24 CP 12 CP 4
Contact classes (%)	In full-time studies, no less than 40 percent of the volume of the bachelor's programme (except for the volume envisaged for internship and the development of a bachelor's thesis or diploma thesis (diploma project)) consists of contact hours.	>40%
Mandatory content in accordance with the standard requirements, indicating the titles of specific study courses and the amount of CP	The mandatory structure of the bachelor's programme consists of: study courses; internship; state examination, the component of which is the development and defense of a bachelor's thesis or diploma thesis (diploma project).	Accomplished
Module for building professional competence of entrepreneurship (if applicable)	-	N/A

Compliance with the requirements of the Law on Environmental Protection and the Law on Civil Defense and Disaster Management	The bachelor's programme also includes the content requirements of the study courses specified in the Law on Environmental Protection and the Law on Civil Protection.	It includes the study course "Environmental protection and civil defence" (2CP)
Degree to be awarded and/or qualification to be obtained	Bachelor's Degree in Engineering	Students who have fulfilled the requirements set out in the study programme and have successfully defended their diploma project, obtain the qualification of a programming engineer and a professional bachelor's degree in information technology.
Possibilities for continuing studies	A bachelor's degree gives the right to continue studies in a master's study programme, a professional master's study programme and a second-level professional higher education programme, if the admission requirements of the relevant study programme have been met, which include appropriate prior knowledge for successful completion of this study programme.	There is an opportunity to study at the master's level

Basic principles and procedures for evaluating the acquisition of the study programme	Regulation of the Cabinet of Ministers No. 240 "Regulations on the standard of national academic education" Part IV "Basic principles and procedures for evaluation of the acquisition of the study programme"	The evaluation of learning outcomes is based on the basic principles as follows : (1) the principle of openness of evaluation; (2) the principle of obligation for assessment; (3) the principle of the possibility of revision of the assessment; (4) the principle of variety of testing methods used in evaluation. The degree of achievement of learning outcomes is evaluated in a 10-point scale or with "passed/failed".

The content of the study programme Programming Engineer consists of:

- general education courses 24 CP;
- basic theoretical courses in the field and courses in information technologies 36 CP;
- professional industry-specialization courses 56 CP
- elective courses 8 CP;
- traineeship – 24 CP;
- diploma project (12 CP).

The first two years of the programme are aligned with the short-cycle programme "Programming and Computer Network Administration", which is a part of the professional bachelor's degree programme "Programming Engineer".

For foreign students, the elective part of the programme includes the 2CP course "Latvian Language", which is compulsory for foreign students. See the study programme plan in Annex 6. The study programme fully complies with the national education standard (see Annex 3) and the professional standard of the Programming engineer (see Annex 4). As the Occupational Standard for Programming Engineers is in the process of being updated, the content of the study programme is based on the requirements of the current standard, but compared and aligned with the draft of occupational standard to be updated.

The aims, content, acquired knowledge, skills and competencies of the study courses are in line with the aims of the study programme and the outcomes to be achieved. In turn, the aims of the study programme and the results to be achieved correspond to the professional standard of a Programming Engineer. There was developed a mapping of the study programme (see Annex 5); it reflects the knowledge, skills and competences specified in the professional standard and the study courses corresponding to them (in which the specific knowledge, skills and competences are acquired). The knowledge, skills and competences to be acquired in each specific study course constitute a small part of the total outcomes to be achieved in the study programme. Therefore, it is important not to lose any of the knowledge, skills or competencies specified in the standard during the study process. Using the study programme mapping, it can be traced that all the knowledge, skills and competencies specified in the professional standard are included in the study

content.

The descriptions of the study courses (see the Annex 7) define the outcomes of the study programme, which are harmonised with the professional standards of the LQF and the Programming engineer, and the corresponding expected knowledge, skills and competences in the specific study courses. The study course programme indicates what grounding (passed courses) is required to acquire the given study course successfully. Therefore, acquisition of the study courses is implemented in the prescribed sequence.

Knowledge of physics, mathematics and informatics is also very important for a Programming engineer. Unfortunately, some of the students have not studied physics at the level of secondary education (they acquired natural sciences instead). Physics I and Physics II are included in the study programme in the amount of 4 CP in the block of theoretical and IT basic courses of the industry. Unfortunately, even in the 4-year period, the average rating of applicants in informatics at the secondary education level is only 48.4%, which is not sufficient for successful studies in the programme, therefore the 1st year programme includes a study course “Information and Communication Technologies” (3CP), which strengthens and improves the basic knowledge of IT and ensures successful acquisition of theoretical and professional specialization courses.

In order to follow the demand of the labour market, scientific tendencies and observe the interests of students, the study programme envisages elective courses (8 CP – in Latvian group, 6 CP – in English group).

The content of the study courses is updated in accordance with the development trends of the industry, the labour market and science. For this purpose, each lecturer regularly follows current events in his / her field; reads scientific literature; works on projects; carry out scientific research; participates in scientific conferences and seminars; visits exhibitions, production companies, Latvian and foreign universities; make appropriate adjustments to the content in his / her study course each year; regularly updates the course programme with the latest literature.

The aims of the study programme, the outcomes to be achieved and the learning outcomes and content of the study courses harmonised with them fully meet the needs of the Information Technology and Computing industry, the requirements of the labour market and scientific trends.

Relevance of the content

According to the forecast of "*The Future of Jobs report of the World Economic Forum (2020)*" until 2025, the greatest demand growth in the sector "Digital Communications and Information Technology" will be observed for the occupations as follows (in order of priority):

1. AI and Machine Learning Specialists; 2. Data Analysts and Scientists; 3. Big Data Specialists; 4. Information Security Analysts;	5. Process Automation Specialists; 6. Digital Marketing and Strategy Specialists; **7. Software and Applications Developers.**

The software developer remains in the top 10 leaderboard. Knowledge and skills in areas such as data science, artificial intelligence, big data, digital marketing, advanced cyber security and the Internet of things can be acquired by 3rd and 4th year students, thus increasing the competitiveness of the programme as a whole. The following study courses are being developed:

Internet of Things IoT, Deep machine learning, Cloud service solutions, Data science and big data technologies, Data processing systems and data warehouses.

When it comes to the local labor market, the technologies used by students during their professional internship were taken into account. RTA students mostly worked with web technologies: ASP .NET MVC and Entity Framework (.Net) or Django/Odoo (Python), which influenced the decision to replace the "Programming I and II" classes in C++ and WinForms development with web technologies "Web Technologies I, II and III".

When updating the programme, advice from employers participating in the evaluation of theses is taken into consideration. In addition, RTA organizes meetings and discussions with employers, updating information on required technologies and employers' recommendations or requests. For example, the programme included the study course "Business process modeling and graphical interface modeling", which provides knowledge of production processes so that developers can communicate with customers, as well as *Start-Up* and *Canvas Models*, which teach students to generate business ideas by developing a prototype of a digital solution. Also, the recommendation of the employers was to introduce the course "Business communication in English".

3.2.2. In the case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels (if applicable).

Not applicable.

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is implemented in a foreign language or in the form of distance learning, describe in detail the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

The content of the study course is acquired in lectures and practical classes. 40 hours are planned for obtaining 1 credit point (1 CP = 1.5 ECTS) of the study course, including 16 contact hours (lectures, practical work or seminars) in the auditorium or computer room. More than 50% of the classes are hands-on, with an emphasis on programming and app development. Each study course description indicates the type of testing– an exam or a test, independent work and evaluation

system.

The opportunity to implement up to 50% of the contact hours in the form of remote studies is welcomed in the study programme. The platform used for basic remote studies is MS Teams, which allows sharing materials, provides chatting opportunities and the possibility to record videos. A backup option is Google Meet, which is more often used for consultations because it can be scheduled in Google Calendar. The ICT department has been using the Moodle system for quite a long time, where lecturers place their teaching materials and students submit their individual works.

The study programme "Programming engineer" is implemented only in Latvian. Implementation options in English will be evaluated during accreditation. However, due to the specifics of the industry, communication in English takes place on several levels. For example, students are taught to follow good software development style and write in English when developing a software code, graphical interfaces, performing system design, etc. The developers' documentation and the latest training materials are only in English, which are used during the course. The course "Computer Networks" is taught in English and is based on an official Cisco course and Cisco materials. The software in the computer classrooms is basically installed with English language settings. In addition, students have the opportunity to use the Erasmus+ exchange programme. There is no separate English course as the schools provide intensive English language training from grades 1 to 12, so the emphasis is put on industry communication. The course "German language" has been added to the study programme, because the current occupational standard requires the knowledge of two foreign languages.

Students have a separate profile in the RTA DVS, where they can access internal procedure documents such as "Internship Regulations", "Regulations on study course exams and tests", "Regulations on scholarships"(only in Latvian), etc. DVS also contains methodological guidelines for the development of internship reports and diploma projects of each study programme. Each student is also provided with a supervisor during internship and qualification work, who introduces the student to methodological guidelines and monitors their implementation. In order to standardize the requirements for all programmes, RTA has developed "Methodological guidelines for the development and defense of study research papers at Rezekne Academy of Technologies". Lecturers have wider access to DVS, which also includes documentation related to the lecturer, such as "Regulations on academic positions at Rezekne Academy of Technologies (RTA)", "Regulations on lecturers of Rezekne Academy of Technologies ", etc. DVS forms a united communication ecosystem lecturer-student-RTA.

Principles of a student-centered approach

The principles of student-centered education in the study programme are ensured, first of all, by evaluating the students' previous preparedness and offering the study content which can ensure the achievement of the study outcomes of the study programme in the most successful way. Secondly, RTA offers flexible study paths, including taking into account students' employment during studies, planning classes at convenient time for students. Thirdly, students are provided with full advisory support and full access to study resources (including those available remotely) necessary for achieving learning outcomes. Fourthly, the study and research activities of students are aimed at the growth of their personality, including promoting the formation of their personality and motivating them for further studies. Fifthly, students are provided with feedback on the evaluation of their study results, which allows them to independently plan the course of their studies and the best ways to achieve their study outcomes.

In order to enliven the implementation of the student-centered study process and motivate the staff, appropriate criteria have been incorporated into the academic staff self-evaluation, which are

defined in the Rector's decree No. 4.20/63 "Procedure for evaluation of the quality of work done by the academic staff of Rezekne Academy of Technologies (RTA)". To sum up, the following categories are provided: 1) student support in the development of scientific publications and participation in conferences; 2) student support in competitions; 3) provision of problem-based studies.

Based on the "RTA quality management policy principles", following the "Regulation on organizing surveys at Rezekne Academy of Technologies (RTA)"(only in Latvian), student questionnaires are conducted at least twice a year - at the end of each study semester. The survey is conducted anonymously, allowing students to give an assessment of each course studied during the semester and its side factors as a material and technical base. Survey results are stored in DVS for 6 years. The study department conducts a graduate survey, while the study process specialists of the faculty conduct a survey of employers.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the study programme is implemented in a foreign language, provide information on how internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

Internship opportunities

The study programme "Programming engineer" includes three internships "Internship I" (4 CP),"Internship II" (12 CP) and “Internship III – pre-diploma internship (8CP). During the internship, students develop new software, improve the existing software or deal with its maintenance.

The first internship is only 4 weeks long, which allows the student to better understand the internship process as a whole and to change the place of internship if the need arises. Internship allows students to learn about labor relations and organization of work in companies.Each internship is defended separately, which requires preparation of a presentation and internship report.

The goal of the internship is to strengthen and supplement the student's knowledge, to improve his professional skills in accordance with the requirements of the profession of a programming engineer. Internship tasks can be divided into general internship tasks, which must be completed by students of all courses during internship, and the internship tasks specific to different courses, where the specifics of each particular course are taken into account.

Each student has 2 internship supervisors: one from RTA, the other one from the company. RTA has concluded basic agreements with internship providers, however, students can choose the place of internship themselves. The place of internship, including foreign companies, is initially chosen by the student himself, but if needed, the student is provided with the help of the Faculty of Engineering and the Department of external relations of RTA in finding the place of internship. Such an approach builds students' skills to look for a job, have a successful interview and position themselves in the labor market, as well as consider future career opportunities and self-development directions.

Internships in Rezekne are provided by such companies as SIA "Midis", SIA "Entrypoint", SIA "Laileo Software", SIA "Wunder Latvia". Starting from 2021 SIA "Geidans Solutions" provides 2 internships for RTA students throughout the year. The largest number of internships is provided by SIA "Midis". It should be noted that the interns are mostly engaged in the development of web application.

Before the Covid-19 pandemic, it was also possible to do an internship at SIA "Microlines" and SIA "Soaphog". However, the Covid-19 pandemic also opened up positive opportunities for RTA students - Riga IT companies became much more open to the remote internship model used by students of the "Programming Engineer" study programme. For example, in neighboring cities, students can find internships in companies such as "Scandiweb" (Jēkabpils) and "TestDevLab" (Daugavpils).

Internships are also provided by the Information and Communication Technology Research Center of the RTA Faculty of Engineering, but such internships are usually practiced for students who are involved in scientific or other RTA projects. The Research Center for Information and Communication Technologies provides internships for foreign students and students of the Exchange Program Erasmus +.

The programme director organizes a briefing about internships and informs twice about internship companies: the first time is at the end of the first academic year before summer holidays and the second time is at the beginning of the autumn semester of the second year. If the student needs some help in finding the internship company, he can also individually approach the programme director or RTA internship supervisor.

Description of internships

Students who want to work in software development companies mostly do internships in SIA "Midis", SIA "Entrypoint" and SIA "Laileo Software".

Working students mostly do internships at their place of work if their goal is to improve their qualifications rather than change their place of work. Such examples include internships at "Institute of Electronics and Computer Science", SIA "Ceram Optec" or SIA "Līv Met". Sometimes, companies, which are not related to IT sphere, turn to RTA for help in developing information systems for them, examples of which are SIA "Refood", SIA "Crystal Rose" and SIA "Rezeknes Satiksme".

Internships in the last 4 years (number of trainees is in parentheses):

SIA "Affix" (1)

SIA "Baltic Air Group" (1)

TERADA (1)

SIA "Entrypoint" (4)

SIA "Lailio Software" (2)

SIA "Latinsof" (1)

SIA "Devera" (1)

SIA "MIDIS" (13)

SIA "Austrumlatvijas koncertzāle" (1)

Prinful (1)

SIA "CUBE Aģentūra" (1)

RTA (12)

Geidans Solutions (2)

LTD VA Dynamics (1)

SIA "TestDevLab" (1)

SIA "Meals-K" (1)

SIA "Exponential technologies" (1)

SIA "Via Pro" (1)

Daugavpils socondary school no. 15 (1)

SIA "IF P&C Insurance AS Latvijas filiāle" (1)

AS “Conexus Baltic Grid” (1)

Work@set/setnology (1)

AS SAF Tehnika (1)
Andijon Tumani Hokimligi (1)

IoT Zigbee (1)

Despite the fact that students have the opportunity to do an internship abroad through the Erasmus+ exchange programme, they have not used such an opportunity.

Connecting internship tasks with the study programme

The purpose of the programme is to prepare specialists in accordance with the national occupational standard "Programming engineer". The current version of the occupational standard provides for much broader requirements including testing, modeling and design skills. Before starting the internship, the student acquires all the training courses. The student is provided with knowledge of the most requested technologies in the local and international market. The current study plan is reinforced in the field of web technologies, which is most often requested by internships and employers, taking into account discussions with them and previous years' experience.

The aims and tasks of the traineeships correspond to the learning outcomes to be achieved in the study programme "Programming engineer". Full information about the organisation of the traineeship; the skills and competencies to be acquired during traineeship , functions of the traineeship supervisor, drawing up the traineeship report, evaluation of the traineeship results are given in the traineeship guidelines in the Appendix 8.

See the traineeship agreements concluded with the companies in the Annex16 (Part 2).

3.2.5. Evaluation and description of the promotion opportunities and the promotion process provided to the students of the doctoral study programme (if applicable).

Not applicable.

3.2.6. Analysis and assessment of the topics of the final theses of the students, their relevance in the respective field, including the labour market, and the marks of the final theses.

The State exam, which includes the defense of the diploma thesis, is the last and most important work for a programming engineer.

The diploma project is a functioning software product developed independently by the student, which the student must demonstrate to the committee during the final examination. The aim of the diploma project is to certify student's skills and abilities, and his competence in application of theoretical knowledge acquired within the study courses in the development of specific software products.

All diploma projects are developed according to uniform requirements:

- Requirements analysis (PPS)
- Design and modeling (PPA)
- Development of a user guide
- Software development

Content of the thesis (indicative)

1. Introduction (purpose, tasks, state at the beginning of the work, relevance, etc.)
2. Analysis of existing software
3. SRS development
4. Selection and justification of work development technologies
5. SDD development
6. Progress of the software development process
7. Control examples
8. User guide and installation manual
9. Conclusions and proposals

Appendices:

1. SRS
2. SDD
3. Software code (not generated)
4. Others according to need

The selection of the topic of diploma thesis is done already in the 4th semester - when developing the Study Paper III. Each student is provided with a supervisor who guides the student's studies and internships up to the diploma project. The choice of the topic can proceed according to several scenarios: a topic chosen by the student at the request of a company, transformation of the tasks performed during the internship into the topic of the diploma project, individual consultations with the supervisor, etc.

The diploma project development process is controlled throughout the semester. The student must regularly report on his progress to his/her supervisor (at least once every 2 weeks) and to the programme director. A Pre-defence is organized a few days before the deadline for submitting the diploma project. In the Pre-defence the quality of the diploma project development is assessed by a

committee consisting of the programme director and diploma project supervisors. After the results of the pre-defence, a final decision is made on admitting the student to the final defense. Only those students whose pre-defense assessment results are "almost good", "good", "very good", "excellent" or "with distinction" are allowed to defend their diploma project. In this way, poorly developed diploma projects are sifted out. The Diploma projects defended in the reporting period were in most cases evaluated with grades 7, 8, 9 (good, very good, excellent). Some diploma projects were evaluated with 6 (almost good) and some with a grade of 10 (with distinction).

The topics of diploma theses of the last years in the study programme "Programming engineer" are shown in the table:

Surname	Name	Title of the diploma project
	student A	Film collectors' portal
	student B	Warehouse management system
	student C	Production accounting system
	student D	Customer service programme
	student E	"Ridiculous finance" decentralized exchange platform
	student F	Automated test result validation system
	student G	Mobile app "Mans Mīlulis"
	student H	Assistant to the car owner
	student I	Video game tournament management system
	student J	Rugby tournament organization system
	student K	Digital Animal Encyclopedia System

The topics of the diploma projects to be developed are relevant to the customer.

Industry professionals are invited to the diploma project defense committee of the RTA study programme "Programming engineer". Representatives of companies who have recently been interested in RTA study programme graduates with the aim of offering them a job in the company

are also invited to the defense sessions. After the defense of the diploma project, the prospective employer can get a complete picture on the level of preparedness of the student as a specialist. Members of the committee always openly point out shortcomings in a particular student's diploma project and comment on student's professional preparedness. These remarks are taken into account when making corrections to the study programme and the content of the respective study courses; in some cases, introducing a new study course. In this way, with each subsequent year the study programme is improved and constantly updated. The process of improving the programme is unceasing.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (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 the learning outcomes to be achieved by providing the respective examples.

The study programme "Engineer of programming" has all the resources and provision of the study field, which are described in detail in criteria 2.3.1-2.3.3. The available infrastructure, laboratory/workshop base and information provision allow to implement the study programme successfully, to achieve all the learning outcomes provided for in it. On average, 50% of the study courses are practical classes when the available software, laboratory/workshop equipment and facilities are used to the maximum extent.

RTA Information Technology Center (ITC) has three computer labs. Computer classrooms are equipped with desks and sockets so that students can use their personal computers during class. Open Wi-Fi is available for all students. One computer classroom is equipped with Cisco and MikroTik equipment to carry out laboratory work in the field of computer networks. All auditoriums and computer rooms are equipped with web cameras and peripheral devices to implement remote or hybrid classes in case of Covid19 restrictions. Students are provided with MS Office365 software package, based on MS Teams. Staff and students prefer Google Meet for consulting purposes.

Computer classrooms are equipped with all necessary software to implement the programme. Every year, during the summer period, the software is updated in the computer rooms, if necessary, the software is updated during the study year at the request of the lecturer. Both Open and Education license software are used during studies.

Since 2007 Rezekne Academy of Technologies is a registered and operates as a local CISCO network academy, which enables students to prepare for the CCNA international computer network specialist certification. Training is conducted according to the CISCO CCNA R&S: *Routing and Switching programme*, using the CISCO online platform of training materials and testing environment. The content of RTA e-courses is integrated into the "Computer Networks" training courses.

Since 2016 RTA has concluded an agreement with MikroTik on the training course "MikroTik MTCNA course" to be delivered by "MikroTik Academy".

Students have access to Azure Dev Tools for Teaching and Google for Education. Several e-learning courses are available as a part of the Microsoft Academy programme. RTA has education licenses for tools such as Enterprise Architecture, BitBucket, GitHub and MatLab.

RTA ITC has created a programmer's room to provide jobs for students who are involved in projects or do internships at RTA.

RTA provides a documentation management system using Sharepoint software opportunities, which gives students access to all documents and methodological guidelines related to the study process. Students are also assigned a new RTA email address using a Google service linked to products such as RTA Moodle, GitHub, BitBucket, Azure Dev Tools for Teaching, Google for Education to identify the student and ensure privacy requirements when using RTA emails instead of students' private e-mail for communication.

Information facilities

The information about the RTA library is available in the description of the study direction (see chapter 2.3.3)

Considering the specifics of the Programmer's profession, lecturers intensively use learning materials, knowledge sites, documentation offered by technology developers, e.g. Microsoft developer documentation, Google developer documentation, Django documentation, Cisco Academy courses, etc. In this way, students not only learn to work with developer's documentation, but also get access to the latest materials that may not even be available in a book form.

Science facilities

The RTA library provides access to such databases as Scopus, Web of Science, Ebsco, Latvian Standards Library, access to the full content of the digital resources periodika.lv and gramatas.lndb.lv of the NLL Digital Library. In 2022, the RTA institutional repository started its work.

3.3.2. Assessment of the study provision and scientific base support, including the resources provided within the framework of cooperation with other science institutes and higher education institutions (applicable to doctoral study programmes) (if applicable).

Not applicable.

3.3.3. Indicate data on the available funding for the corresponding study programme, its funding sources and their use for the development of the study programme. Provide information on the costs per one student within this study programme, indicating the items included in the cost calculation and the percentage distribution of funding between the specified items. The minimum number of students in the study programme in order to ensure the profitability of the study programme (indicating separately the information on each language, type and form of the study programme implementation).

Information on the financing of the study programme "Engineer of programming" (including by years in the reporting period) and its sources is viewed in detail in the criterion 2.3.1.

RTA calculations suggest that the direct costs of the second level professional higher education study programme "Engineer of programming" (remuneration of academic and general staff) are EUR 1833.87/75% per one reference student a year, the indirect costs (expenses for ensuring RTA activities, including library, immovable property tax, rent of premises, operating expenses of buildings and equipment, telephone subscription and service costs, utilities, current repairs, special programmes, etc.) are EUR 611,29 / 25% per one reference student a year. In general, the tuition costs for one full-time student(from Latvija or EU) are estimated at EUR 2,445,17 per year, which does not exceed the costs in European states for the training of one student in a similar speciality. The minimum number of students that will ensure the profitability of the study program is 7 students in one study year.

The annual study costs for one non-EU student are estimated at EUR 2,400.00; direct costs amount to EUR 1,800.00 per one reference student a year, indirect costs amount to EUR 600.00 per one reference student a year. The minimum number of students that will ensure the profitability of the study program is 5 students in one study year.

Funding of the study programme Programming Engineer

Financial year

2017

2018

2019

2020

2021

2022
Minimum Ratio of Study Costs:

1.5 1.5 1.5 1.5 1.5 1.5
Ratio of Study Level:

1 1 1 1 1 1
Basic Costs of Studies (euro)

1393.22 1458.51 1518.98 1525.67 1630.11 1630.11
Amount of scholarship (euro)

150.82 150.82 150.82 150.82 200 251.98
Sports, culture, student hostel (euro)

13.52 13.52 13.52 13.52 13.52 13.52
The number of state-budget funded study places

79 79 70 70 70 74
The number of state-budget funded study places

178179 185816 170997 171696 186108 200589

3.4. Teaching Staff

3.4.1. Assessment of the compliance of the qualification of the teaching staff members (academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants) involved in the implementation of the study programme with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments. Provide information on how the qualification of the teaching staff members contributes to the achievement of the learning outcomes.

28 lecturers are involved in implementation of the study programme "Engineer of programming". Of them, 18 (64%) lecturers are elected to the academic and/or scientific position at RTA, 10 (36%)- are non-elected at RTA. 11 (39%) lecturers have a doctoral degree; 10 of them are RTA elected.

Distribution of elected lecturers of the study programme "Engineer of programming" by positions:

- Professors – 4 (including, RTA-elected leading researchers- 2);
- Assoc. professors- 4 (including, RTA-elected leading researchers- 3, researcher- 1);
- Docents – 1 (including, RTA-elected leading researchers- 1);
- Lecturers -8 (including, RTA-elected researchers- 2);

Distribution of guest lecturers of the study programme "Engineer of programming" by positions:

- Guest Professors – 0;
- Guest Docents – 2 (including, RTA-elected researcher- 1)
- Guest Lecturers - 9.

For full information about study programme lecturers and their publications see Annex 14 and for the lecturers' CVs – Annex 10. For the certification of SF lecturers' official language knowledge, see Annex 11, for the certification of SF lecturers' English language knowledge – Annex 12.

Lecturers-practitioners with extensive professional work experience in the field are involved in the implementation of study programme (see criterion 2.3.6 of the Chapter 2). The qualification of the teaching staff fully complies with the requirements of the laws and regulations and ensures the achievement of the learning outcomes of the study programme.

3.4.2. Analysis and assessment of the changes to the composition of the teaching staff over the reporting period and their impact on the study quality.

Opportunities to attract new, perspective staff for the implementation of the study process are constantly being sought.

Study programme lecturers

Improvements were made both by increasing the competence of lecturers and by attracting new specialists, thus updating the generation of lecturers.

In terms of **competence**, lecturers are actively engaged in the implementation of research

projects:

Year	Project	Lecturer
2016-2018	Developing The Competence Center for Mechanical Engineering (1.2.1.1/16/A/003)	A.Teilāns
2018-2019	Laser processing optimization tool (KC-PI-2017/97)	A.Teilāns
2020-2022	LZP-2019/1-0094 Application of deep machine learning and data mining for the study of plant-pathogen interactions: apple and pear scab pathosystems	A.Teilāns, I.Zarembo, P.Grabusts, S.Kodors, I.Kangro, I.Apeināns
2020	VPP-COVID-2020/1-0009 ARTSS: Perspective technologies for sustainable and secure services	A.Teilāns, I.Zarembo, P.Grabusts, S.Kodors
2021	E-mentor as a transformation tool for ensuring zero-waste food consumption in educational institutions	S.Kodors, L.Litavniece
2022-2024	Development of autonomous unmanned aerial vehicles based decision-making system for smart fruit growing Nr. lzp-2021/1-0134)	I.Zarembo, S.Kodors, L.Litavniece, I.Apeināns
2022-2023	"Building the Digital Capacity of Higher Education Institutions with the Integration of Online Learning Resources and Analytics Intelligence" (EduAim) Nr.8.2.3.0/22/A/003	A.Teilāns P.Grabusts A.Zorins I.Zarembo A.Skromulis

Lecturers I.Kangro, M.Kijaško, L.Litavniece, P.Grabusts, S.Kodors and A.Teilāns were involved in competence enhancement activities within the project, "Strengthening the academic staff of the Rezekne Academy of Technologies in the study directions "Mechanics and metalworking, thermal energy, thermal engineering and mechanical engineering" and "Management, administration and real estate management", no. 8.2.2.0/18/A/016". Competence enhancement included improving English language and leadership skills.

Staff changes: until AY 2021-2022 there were no significant staff changes, as RTA focused on the staff involved in scientific projects.

Significant staff changes were in AY 2021-2022. The lecturer Dr.sc.ing doc. Imants Zarembo was invited to implement the study course "Project Management", replacing Dr.sc.ing. prof. A. Teilāns. The decision was made in the result of strategic planning, which envisaged to renew the generation of lecturers and increase the number of staff. A. Teilāns moved to the position of the dean and became more prominent in science. On the other hand, I. Zarembo not only leads RTA IT scientific projects, but is a representative of the industry, working at AS "Printfull Latvia". Previously he was a member of the board at the computer game development company SIA "Soaphog". In AY 2021-2022 a doctoral student Mg.sc.comp. Ilmārs Apeināns joined the RTA staff. He has been working on RTA scientific projects since his bachelor's studies, fulfilling the duties of a programmer, implementing mobile and web apps, integrating and training artificial intelligence. I.Apeināns has prepared and delivers the course "Web technologies I", which involves front-end development. With

AY 2022-2023 I.Apeināns delivers the course "Web Technologies II". I. Apeinān's courses are based on Dr.sc.ing. S. Kodor's course "Development and use of content management systems", strategically/gradually replacing and updating staff, as well as coming in line with the tasks of career growth.

In AY 2022-2023 modernization of the programme continues by including the course "Business process modeling and graphic interface prototyping" according to the plan, and in accordance with the employers' request to strengthen students' knowledge in entrepreneurship and production processes. Dr.oec Lienīte Litavniece, who is not only engaged in project development and management, but is also a practicing entrepreneur (SIA "Safīra L") and a member of the Latgale Regional Council of the Latvian Chamber of Commerce and Industry (LCCI), which is the largest business association in Latvia and has nearly 6,000 members (3,000 individual companies and 3,000 business associations), was invited to join the team. The aim of the course is also to give Start-Up skills, so students have to design a business-oriented idea in an app prototype. Dr.sc.ing I. Zarembo, who had specialized in creating app prototypes while working in IT companies, was engaged to deliver classes in prototyping. S. Kodors teaches requirements engineering and business process modeling tools, transferring experience from projects to the implementation of contractual research and work with clients (customers of computer software prototypes).

Upon the employers' recommendation, a new course "Business communication in English" was introduced and delivered by Mg.S. Iljina. Mg. R. Glaudiņš has developed the course "Progressive Information Technologies".

In the spring of 2022, radical changes were made in the study programme. As a result, it was decided to harmonize the programmes "Programming and computer network administration" and "Programming engineer" so that after completing the 2-year programme, graduates could enter the 3rd year, continuing their studies at the bachelor's level. As a result, there was the integration of the "Programming Engineer" courses and the new standard provided for new requirements. During the adjustment process, several new study courses related to intelligent computer technologies were introduced in the 3rd and 4th year programmes.

The course "Programming I" (5 CP, I. Meirāns), which covered the basics of programming, was replaced by the joint RTA course "Information and communication technologies" (3 CP, J. Musatovs and A. Zorins). A new occupational standard stipulated the requirement to include the theory of algorithms, so the "Programming Engineer" courses "Algorithms and Data Structures I/II" (3+2 CP) and "Theories of Algorithms" (1 CP) were combined into the course "Algorithms and Data Structures" (4 CP), including the fundamentals of programming and reducing the total number of Credit Points in the result of integrated material. The course "Programming II" (5 CP) was replaced by an alternative "Programming engineers" course "Introduction to app application and testing" (3 CP), as the updated standard provides for greater emphasis on testing (as a result, Mg.sc.comp. J. Musatov was replaced by Mg.sc .comp. A. Zorins). On the other hand, the course "IT Standards" (2KP) was transferred to "Programming engineers", while the basic material (basics) is included in the courses "Information and communication technologies", "Optimization of business processes and prototyping of graphic interfaces", "Software engineering I, II". 4CP went to the courses "Web technologies I, II", delivered by Phd student I. Apeināns.

It is not possible to dispense with programming in the 1st year course yet, because the biggest part of the enrolled students does not know this material. In the future RTA Center for lifelong education is considered as a solution, when students with a low level of programming knowledge could take additional courses before their studies.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals or peer-reviewed monographs may be additionally specified. Information on the teaching staff included in the database of experts of the Latvian Council of Science in the relevant field of science (total number, name of the lecturer, field of science in which the teaching staff has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

Not applicable.

3.4.4. Information on the participation of the academic staff, involved in the implementation of the doctoral study programme, in scientific projects as project managers or prime contractors/ subproject managers/ leading researchers by specifying the name of the relevant project, as well as the source and the amount of the funding. Provide information on the reporting period (if applicable).

Not applicable.

3.4.5. Assessment of the cooperation between the teaching staff members by specifying the mechanisms used to promote the cooperation and ensure the interrelation between the study programme and study courses/ modules. Specify also the proportion of the number of the students and the teaching staff within the study programme (at the moment of the submission of the Self-Assessment Report).

Mutual cooperation

The basic cooperation model is developed by the programme director, based on the standard requirements of the occupation, current technologies, employers'demand, previous years' experience, available staff and the involvement of staff in projects. New models are coordinated with the Dean and the Head of study direction.

Lecturers cooperate with each other during the study process. The following mechanisms are used to promote cooperation:

- lecturers' work (office) places are located in the same or adjacent rooms; lecturers often meet up; regularly exchange information concerning the study process, scientific research

and the development of projects; this is particularly important during project development, as immediate discussion with colleagues can significantly speed up the solution to a problem;
- the principle of mutual assistance; lecturers, engineers, laboratory assistants always help each other with professional advice/consultation.
- joint meetings of lecturers and last semester students on the development of diploma paper projects.
- joint work in scientific projects and commissioned research;
- work on joint publications and participation in conferences.

At the course level, the descriptions are prepared by lecturers based on their competence, trends in the field and topicality of technologies/methods/tools.

The study programme includes integrated courses taught by several lecturers together:

- "Business process modeling and graphic interface prototyping", L.Litavniece, I.Zarembo, S.Kodors;
- "Project management", L.Litavniece, I.Zarembo, V.Dubovskis.
- "Information and communication technologies", A. Zorins, J. Musatovs.
- "Physics", A.Martinovs, J.Pigožnis.
- "Environmental protection and Civil Defence", Ē. Teirumnieka, E. Šiļina.

Individual tasks are interrelated and the lecturers grade students together, taking into account the content of individual tasks.

Internship reports and defenses of qualification works are reviewed and assessed by supervisors under the programme director’s guidance.

The teaching staff actively works in joint scientific projects (see chapter 3.4.2). One of the criteria in the distribution of study courses, materials and technologies is the roles of lecturers in scientific projects and administrative positions at RTA.

In November 2022, there are 82 students in the study programme of Mechatronics and 28 lecturers are involved in its implementation.

The ratio of students to teaching staff in the study program is considered according to the OECD methodology, dividing the full-time equivalent (FTE) of students in the program (32,8) by the full-time equivalent of the teaching staff employed in the program FTE (1,9). At the time of submitting the self-assessment in 2021 the ratio of teaching staff to students is 17, which slightly exceeds the average of Latvia (14), EU countries (14) and OECD countries (15) in higher education programmes in the public university sector. Taking into account the fact that professional specialization study courses occupy an important place in the programme, the lower ratio of students and teaching staff promotes the implementation of a student-oriented study process and a more individual approach to the needs of students.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Annex 1.7z	Annex 1.7z
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 2.docx	2.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 3.docx	3.pielikums.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 4.7z	4.pielikums.7z
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 5.xlsx	5.pielikums.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 6.docx	6.pielikums.docx
Descriptions of the study courses/ modules	Annex 7.7z	7.pielikums.7z
Description of the organisation of the internship of the students (if applicable)	Annex 8.doc	8.pielikums.doc
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Sociotechnical System Engineering (51482)

Study field	*Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science*
ProcedureStudyProgram.Name	*Sociotechnical System Engineering*
Education classification code	*51482*
Type of the study programme	*Doctoral study programme*
Name of the study programme director	*Artis*
Surname of the study programme director	*Teilāns*
E-mail of the study programme director	*artis.teilans@rta.lv*
Title of the study programme director	*Profesors, Dr.Sc.Ing.*
Phone of the study programme director	*+371 26529669*
Goal of the study programme	*to promote the development of the field of electrical engineering, electronics, information and communication technologies and to create a competitive generation of young scientists of an international level, who are able to introduce the latest scientific knowledge of system engineering into the national economy, achieving an increase in the efficiency of the industry and the reliability of the systems, and improvement in product and service quality.*
Tasks of the study programme	*to prepare scientists in the sub-sector of systems analysis, modeling and design of electrical engineering, electronics, information and communication technology sector and to promote the application of students' theoretical knowledge, cognition, as well as research skills and research results in the following environments:* *- modeling of business and tourism information systems;* *- planning of systemic regional development;* *- modeling of the political system and public management;* *- modeling of logistics information and transport systems;* *- modeling of production processes;* *- construction of e-learning systems;* *- improvement of imitation modeling technology.*

Results of the study programme	*1. knowledge of the latest information technologies;* *2. management and dvelopment of research methodology and modern research methods in the information technology sector;* *3. ability to independently evaluate and select appropriate methods for engineering research;* *4. personal contribution to the development of information technology and ability to give new understanding to the existing knowledge, as well as its application in practice, by developing original research solutions (doctoral thesis), part of which is at the level of internationally cited publications;* *5. ability to perform independent critical analysis, synthesis and evaluation, to solve important research and innovative tasks;* *6. ability to independently propose a research idea, plan, structure and manage scientific research projects, including international projects;* *7. ability to take responsibility for the ethical aspects of the research activity;* *8. ability to communicate orally and in writing about the field of the research within the boundaries of the information technology sector and the sub-sector of systems analysis, modeling and design, with wider scientific community and society in general;* *9. the ability to independently raise and expand personal scientific qualification;*
Final examination upon the completion of the study programme	*Doctoral thesis.*

Study programme forms

Full time studies - 3 years - latvian

Study type and form	*Full time studies*
Duration in full years	*3*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*120*
Admission requirements (in English)	*Master's degree in modelling of socio-technical systems or in information technology, or in computer science, as well as in other natural sciences and management sciences, or an equivalent higher education, if mathematical and/or computer simulation has been studied in the previous education. For studies in English: a certificate of proficiency in English at least at B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph. D.) in Engineering and Technology*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

Full time studies - 3 years - english

Study type and form	*Full time studies*
Duration in full years	*3*
Duration in month	*0*
Language	*english*
Amount (CP)	*120*
Admission requirements (in English)	*Master's degree in modelling of socio-technical systems or in information technology, or in computer science, as well as in other natural sciences and management sciences, or an equivalent higher education, if mathematical and/or computer simulation has been studied in the previous education. For studies in English: a certificate of proficiency in English at least at B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph. D.) in Engineering and Technology*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

3.1. Indicators Describing the Study Programme

3.1.1. Description and analysis of changes in the parameters of the study programme made since the issuance of the previous accreditation form of the study field or issuance of the study programme license, if the study programme is not included on the accreditation form of the study field, including changes planned within the evaluation procedure of the study field evaluation procedure.

Since the previous accreditation, the joint doctoral study programme "Modelling of Sociotechnical Systems" has:

1. specified goal and learning outcomes of the doctoral programme (see chapter 6.1.2)
2. the content of the programme has been supplemented with courses in the IT sector and the distribution of CP between compulsory study courses, special courses of the science sub-sector and optional courses has been revised and changed:

	in the previous stage	updated distribution
Special courses in the direction science subsector (A)	7 CP	8 CP
Compulsory courses (A)	10 CP	8 CP
Elective courses (B)	3 CP	4 CP

The total amount of theoretical study courses (20 CP) has not been changed.

Evaluating the experience of implementing the joint programme and planning its development, the partners (RTA and ViA) have decided to change the name of the study programme from "Modeling of sociotechnical systems " to "Sociotechnical systems engineering". Experience shows that many sociotechnical systems engineering specialists have experience in the IT industry (system analysis and design), but their previously acquired master's education is in management sciences or economics. The change of name will strengthen the inclusion of the joint doctoral study programme in the scientific ecosystem of ViA and RTA, especially through cooperation with the Institute of Sociotechnical Systems Engineering of ViA and the Scientific Institute of Engineering and Research Institute for Business and Social Processes of RTA.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree, professional qualification/professional qualification requirements or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

Joint doctoral study programme “Modeling of Sociotechnical Systems” corresponds to the study direction "Information technology, computer engineering, electronics, telecommunications, computer management and computer science".

The thematic groups of study and research (computer use, computer systems, databases and computer networks, programming) covered by the study programme corresponding to the thematic field of education programmes "Computer Science" form an analytical basis for the doctoral study programme "Modelling of Sociotechnical Systems", which correlates with such science sub-sectors of Electrical Engineering, Electronics, Information and communication technologies as Computer control and Systems analysis, modeling and design.

The study programmes corresponding to the educational programme group Mechanics and Metalworking have been created as interrelated, supplementing and successive:

- First level professional higher education bachelor’s study programme **Programming and Computer Network Administration,**
- Professional bachelor’s study programme **Software engineer,**
- Academic master’s study programme **Electronic Commerce Information Systems,**
- Joint doctoral study programme **Sociotechnical Systems Modelling.**

The joint doctoral study programme "Modelling of socio-technical systems" is aimed at eliminating problems specific to Latvia and Europe, which are related to the limited interdisciplinary skills and cooperation opportunities of specialists and scientists. **First of all,** branch specialists still have a characteristic tendency to use only solution methods accepted in their field, abstracting from the methods used in other branches, in solving similar issues. Specialists of technical sciences still consider social factors of systems as unimportant, but specialists of social sciences forget about the peculiarities of technical systems, as a result of which the goal of developing a management system is not achieved. **Secondly,** there are tendencies to absolutize the application of the used mathematical apparatus, which hinders the effective achievement of transparent solutions, as well as their implementation in the national economy. **Thirdly,** the proposed solutions are cumbersome, difficult to adapt, and making changes to the existing solutions takes too much time. **Fourthly,** there is a lack of a sufficiently high level of abstraction and compatible means of simulation modeling, which would be available and effectively used both in the national economy, in public administration and in the social sphere without in-depth mathematical knowledge and programming skills. **Fifthly,** there are no common standards that can bring together disparate simulation technologies to build widely available and distributed simulation environments. The task of doctoral students of the study programme is to work on these issues.

As the Programme was created as a joint doctoral study programme in partnership with Vidzeme University of Applied Sciences (ViA), the partner universities have the opportunity to take over the experience and develop the relevant IT study direction in Latvia. Secondly, the doctoral study programme will promote renewal of academic staff and involvement of the young researchers in studies and research. Thirdly, the doctoral study programme will intensify international cooperation in science promoting development of joint scientific publications and preparation of scientific projects. Fourthly, the doctoral programme will promote creation and management of intellectual property.

The title, aim, tasks and learning outcomes of the programme are defined in accordance with:

1. The National Classifications Framework complying with the European Qualifications Framework. As the doctoral study programme corresponds to **level 8 of LQF**, its learning

outcomes are defined in accordance with the descriptions of knowledge, skills and competences corresponding to the level 8, which are available in Regulation of the Cabinet of Ministers (Cabinet Regulation) No. 332 *Regulations on the Classification of Education in Latvia* of 13.06.2017.
2. Cabinet Regulation No. 49 *Regulations on Latvian Science Branches and Sub-Branches* and Cabinet Regulation No. 522 *Procedure and Criteria for Conferring Doctoral Degrees*.

The programme is based on the evaluated best practices of the EU countries, including regarding the study content, the applied teaching, learning and evaluation methods. The programme is planned so that it would facilitate development and defence of the doctoral thesis in the specified study period, in accordance with the latest trends in the implementation of doctoral studies in Bulgaria and Latvia.

The goal of the joint Doctoral study programme **coordinated with ViA** is to promote the development of the field of electrical engineering, electronics, information and communication technologies and to create a competitive generation of young scientists of an international level, who are able to introduce the latest scientific knowledge of system engineering into the national economy, achieving an increase in the efficiency of the industry and the reliability of the systems, and improvement in product and service quality.

The basic **task** of the joint Doctoral study programme is to prepare scientists in the sub-sector of systems analysis, modeling and design of electrical engineering, electronics, information and communication technology sector and to promote the application of students' theoretical knowledge, cognition, as well as research skills and research results in the following environments:

- modeling of business and tourism information systems;
- planning of systemic regional development;
- modeling of the political system and public management;
- modeling of logistics information and transport systems;
- modeling of production processes;
- construction of e-learning systems;
- improvement of imitation modeling technology.

By fulfilling the requirements of the joint doctoral study programme "Modeling of socio-technical systems" and by developing and publicly defending a doctoral thesis in the field of electrical engineering, electronics, information and communication technology, it is possible to obtain a scientific doctoral degree Doctor of Science (PhD) in electrical engineering, electronics, information and communication technologies. According to the Cabinet of Ministers regulations No. 1000 of 27.12.2005. both RTA and ViA have the right to confer doctoral degrees in electrical engineering, electronics, information and communication technologies for the period of accreditation of doctoral study programmes.

The learning outcomes of the doctoral programme are as follows:

1. knowledge of the latest information technologies;
2. management and dvelopment of research methodology and modern research methods in the information technology sector;
3. ability to independently evaluate and select appropriate methods for engineering research;
4. personal contribution to the development of information technology and ability to give new understanding to the existing knowledge, as well as its application in practice, by developing original research solutions (doctoral thesis), part of which is at the level of internationally cited publications;
5. ability to perform independent critical analysis, synthesis and evaluation, to solve important

research and innovative tasks;
6. ability to independently propose a research idea, plan, structure and manage scientific research projects, including international projects;
7. ability to take responsibility for the ethical aspects of the research activity;
8. ability to communicate orally and in writing about the field of the research within the boundaries of the information technology sector and the sub-sector of systems analysis, modeling and design, with wider scientific community and society in general;
9. the ability to independently raise and expand personal scientific qualification;

By completing the programme, the doctoral students will have:

- learned modern research methods, as well as acquired the skill to apply them in their research;
- acquired the ability to prepare scientific publications, create scientific reviews, creatively solve theoretical and practical engineering issues in the information technology sector;
- acquired the skill to present research and their results at scientific conferences and seminars;
- developed and submitted a doctoral thesis prepared at a high scientific and technical level.

The main difference from other doctoral study programmes is as follows:

- The specific study programme is interdisciplinary, as it focuses mainly on sociotechnical systems engineering, respecting both the technical and social aspects of systems, in order to develop new systems analysis and design methods, as well as new system modeling tools, which may be relevant to the field of computer science;
- A joint study programme of Latvian universities of applied sciences, which provides a spectrum of research in all regions of Latvia and in the sectors corresponding to the programme.

In order to strengthen cooperation among universities, RTA jointly with ViA and VUAS implements the ESF project "Strengthening the academic staff of higher education institutions in the areas of strategic specialization of RTA, VeA and VUAS" (8.2.2.0. /20/I/005). In RTA, VUAS and ViA doctoral study programme (DSP) development plans, the higher education and science are identified as sectors with significant horizontal influence that contribute to the development of human resources and economy and the transformation of the national economy of Latvia. The task of this project is to attract doctoral students, to promote technical development and content of the doctoral programme, facilitating the piloting of any innovation in practice and adapting it to needs and realities. Providing the support of the University cooperation partners and experts from other cooperating universities and involving them in various activities and events, facilitates the research process of doctoral students and allow the young researchers to obtain the latest information about innovations in the industry or in fundamental/applied research for the development of their doctoral theses, which in turn will ensure that the doctoral theses are relevant and will help develop the career path of doctoral students.

The implementation of the study program in English requires the mastering of the Latvian language for doctoral students from abroad.

3.1.3. Economic and/ or social substantiation of the study programme, analysis of graduates' employment.

The operating principles of the joint doctoral study programme are aligned with Latvian and EU strategic documents and development challenges. In the **European Digital Decade 2030 programme**, a significant role is assigned to the cooperation of regional, urban and local communities [1]. The **ESF project** "Strengthening the academic staff of higher education institutions in the areas of strategic specialization of RTA, VUAS and ViA (8.2.2.0. /20/I/005) gives the opportunity to plan the enlargement of the consortium, cooperating also with VUAS and thus covering the regions of Latvia - Latgale, Vidzeme and Kurzeme.

Doctoral level studies in the ICT sector are the third least popular group after services and agriculture, where only 4.8% of all doctoral students study in OECD countries in 2020 (for comparison - 19.6% study in the most popular Natural Sciences group) [2]

The strategy of the joint doctoral study programme of RTA and ViA correlates with the involvement of information technology emphasized in the European digital transformation in the areas such as cyber security, digital inclusion, digital public services and the environment, the green digital industry, language technologies, media and digital culture, the next generation Internet, and etc.

The joint doctoral programme is focused on current societal challenges and industry demand. During the reference period (from 2017), 15 doctoral students studied in the RTA doctoral programme, 3 obtained a doctoral degree, 3 completed the theoretical course of the programme, 2 have not returned from academic leave, 6 left their studies of their own accord (1 switched to a doctoral study programme in social sciences) , 6 are currently studying (one is on academic leave). The 3 defended doctoral theses were developed in the fields of geoinformation (S.Kodors, I.Zarembo) and language technologies (A.Ataols-Bērziņš). 10 out of 15 doctoral students' field of activity is related to higher education and/or professional activity. 9 of them work in RTA's academic and/or scientific sector as lecturers, assistant professors, associate professors, researchers and leading researchers. The statistics of RTA doctoral programme graduates confirm the OECD statistics on the employment of doctoral programme graduates (97%), which exceeds the EU and OECD average indicator (93%).

Graduates of the doctoral programme have opportunities not only to work as lecturers and/or researchers, but also to apply for and participate in a postdoctoral grant, as well as to write and conduct other research projects. There are wide employment opportunities in national and international projects, where the IT science and research component is one of the priorities.

[1] "2030 Digital Compass: the European way for the Digital Decade." https://futurium.ec.europa.eu/en/digital-compass/regions

[2] Education at Glance, 2022. Figure B4.6. Distribution of new entrants to doctoral programmes, by field of study (2020). https://www.compareyourcountry.org/snaps/education-at-a-glance-2022/en/4528/2020

3.1.4. Statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down into different study forms, types, and languages.

Enrolled in the programme	Number of students in the programme (as of 1.10)		Graduates of the programme				
	ViA	RTA	ViA	RTA	ViA (as a degree holder)	RTA (completed the programme)	RTA (a degree holder)
2017	3	3	5	9	-	1	2
2018	3	1	7	8	-	-	-
2019	3	4	9	6	1	1	-
2020	2	2	8	6	-	1	1
2021	5	-	10	4	-	-	-
2022	1	2	10	6	2	-	-
Kopā	17	12			3	3	3

Statistics show that during the RTA reference period, the statistics of obtaining a scientific doctor's degree is 20%, which is higher than the common indicators of Latvia. OECD statistics show that in 2020 Latvia has the second lowest percentage of PhD holders after Chile. Unfortunately, under the influence of external circumstances, the number of doctoral students enrolled in the 1st year has also decreased, which correlates with the common indicators of OECD countries ,and which show that in the period 2013-2020, the number of doctoral students in OECD countries decreased by 4%, or on average by 330,000 doctoral students.

3.1.5. Substantiation of the development of the joint study programme and description and evaluation of the choice of partner universities, including information on the development and implementation of the joint study programme (if applicable).

The joint doctoral study programme was launched in 2011 and is fully consistent with RTA's strategic planning documents, which provides for RTA to become the leading engineering and technology research and innovation centre in Eastern Latvia, including ensuring purposeful, coordinated and successive implementation of STEM and resource-intensive study directions focused on the development, acquisition and application of innovative technologies in the Latgale region, training the specialists required for the economic growth of Latgale, Latvia and Europe, promoting involvement of the new specialists in science and research, as well as development of the knowledge society and introduction of digitalisation.

The programme has been developed pursuant to the **Doctoral Study Programme Development Plan of RTA 2020-2026** and submitted it to the Ministry of Education and Science for approval.

The plan:

- provides for measures to ensure the research environment,
- evaluates the compliance of doctoral study programmes and Doctoral Schools with European best practices and international standards,
- plans establishment of Doctoral Schools, their functions and operating models,
- outlines the procedures for internal assessment of the quality of doctoral study programmes,
- provides for a system of advanced training for lecturers of doctoral study programmes and supervisors of doctoral theses,
- criteria for selection of reviewers,
- principles of introduction of academic ethics procedures,
- applicant selection procedures for doctoral study programmes, provision of research places and remuneration during the doctoral study process,
- career development opportunities for doctoral students,
- involvement in post-doctoral activities,
- outlines the conditions for cooperation with other Latvian and foreign scientific institutions, other higher education institutions.

The doctoral study development plan also includes conceptual implementation of **joint interdisciplinary Doctoral School of RTA, Vidzeme University of Applied Sciences (ViA) and Ventspils University of Applied Sciences (VUAS).** The beginning of its establishment is planned in 2022. Doctoral study programmes of RTA to be implemented within the joint interdisciplinary Doctoral School of RTA, ViA and VUAS are given in the Figure 3.1.5.1.

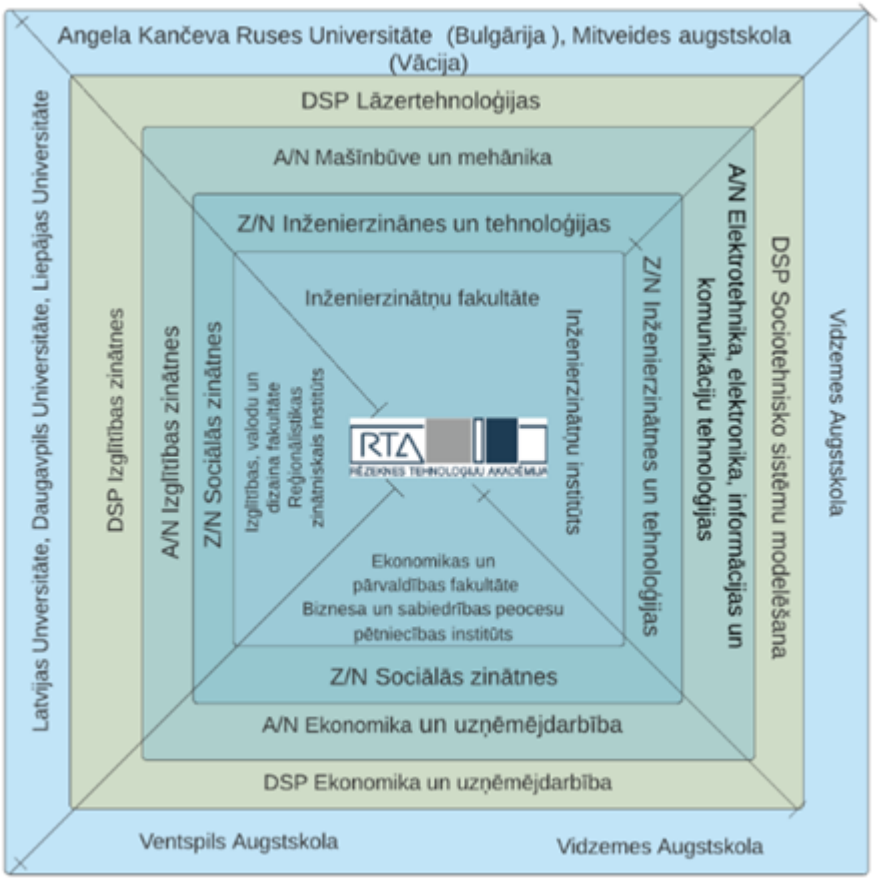

Figure 3.1.5.1. System of RTA for doctoral study programmes

The programme is implemented jointly with ViA. During the study process. Seminars and summer schools for doctoral students, exchange of academic staff in study courses, and joint work in the doctoral council are organized jointly. When starting the establishment of the doctoral school in

2023, it is planned to cooperate with VUAS, which is a partner of ViA and RTA in the ESF project "Strengthening the academic staff of higher education institutions in the areas of strategic specialization of RTA, VUAS and ViA" (8.2.2.0. /20/I/005) The positive fact is that the joint doctoral study programme "Economics and Business" of all three partner institutions (RTA, ViA, VUAS) was accredited in 2021.

The doctoral study programme was created so that students who have obtained a master's degree in the programmes “Modeling of Sociotechnical Systems” or “Information Technology” or “Computer Science”, as well as other natural and engineering sciences (if they have learned mathematical and/or simulation modeling during their studies), could deepen their knowledge in system modeling and continue work on the development of a doctoral thesis according to the sub-sector of science and the application environment. The experience of previous years shows that the desire to study in the joint doctoral programme is expressed by IT specialists who have previous experience in system modeling and development, but their previous degree is in business or management sciences. Therefore RTA and ViA consider it necessary to make changes to the admission rules and, when accrediting the study programme, in addition to the existing requirements, admit applicants with a master's degree in business or management sciences, which are binding on both RTA and ViA.

3.2. The Content of Studies and Implementation Thereof

3.2.1. Analysis of the content of the study programme. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators with the aims of the study course/ module and the aims and intended outcomes of the study programme. Assessment of the relevance of the content of the study courses/ modules and compliance with the needs of the relevant industry, labour market and with the trends in science on how and whether the content of the study courses/ modules is updated in line with the development trends of the relevant industry, labour market, and science.

The content of the study programme and all study courses have been developed taking into consideration current trends in the field in Europe and the world. While developing the RTA doctoral development plan, the RTA working group evaluated the relevance of the programme. **Salzburg recommendations for doctoral study programmes** and the **Salzburg Recommendation Progress Report** [1].

- Research-based studies. A volume of 90 CP, which is equal to 75% of the doctoral study programme Laser Technologies, is allocated for scientific work, encompassing the development of a doctoral thesis, preparation of scientific publications and presentations at scientific conferences, participation in the development and implementation of scientific projects.
- **Relevance of doctoral graduates for the labour market.** The Programme delineates three main graduate career lines: 1) post-doctoral research, 2) academic (also scientific) work at higher education and scientific institutions, 3) employment with enterprises within the industry in order to strengthen the scientific, innovative and technological capacity thereof. The Salzburg Recommendation Progress Report also defines a new challenge – to

create a conclusive coherence between the higher education sector and the public. A major emphasis within the boundaries of the Sociotechnical System Modelling study programme is the cooperation with Latvian and foreign companies in the industry, which reveals many opportunities for doctoral students to perform scientific research important for the industry.

- Reflection in strategy and policy of the higher education institutions. The programme is fully in line with development strategy of RTA and future challenges.
- One of the strengths of doctoral programmes, including joint doctoral programmes, is their diversity in Europe. This diversity must be based on quality and good practice. RTA also cooperates with other universities (RTU, VUAS) in the implementation of the programme.)
- Doctoral students are scientists at their earlier stage, and they need to be recognised as professionals with the corresponding range of rights, who make a considerable contribution into the creation of new knowledge. Pursuant to the Doctoral study programme development plan of RTA, drawn up based on the new doctoral study funding model in Latvia, doctoral students will be enrolled to Programme in the position of non-elected scientific staff. In addition, doctoral students will be involved in research projects implemented by RTA and cooperation partners.
- The crucial role of supervising and evaluating a doctoral thesis: **as regards each individual doctoral student, organization of supervision and evaluation must be based on a clear and transparent contractual relationship, which provides for division of responsibilities between the doctoral student, the supervisor and the higher education institution (and other parties if necessary).** The Doctoral study programme development plan of RTA prescribes that, starting from 2023, a trilateral agreement will be made upon commencement of doctoral studies between a doctoral student, RTA and the doctoral thesis supervisor.
- Critical mass must be achieved. Critical mass, within the context of the Salzburg Recommendations, is an incitement to reach critical mass, encompassing, inter alia, regional, countrywide cooperation between universities.
- Doctoral programmes must be of appropriate duration (three to four years). The duration of the programme is three years 120 CP (180 ECTS), which corresponds to the international standards.
- Promotion of innovative structures: meeting the needs for interdisciplinary training and developing transversal skills. For this purpose, RTA and ViA regularly organize summer schools for doctoral students, where there is an academic exchange of ideas between doctoral students, scientists and industry professionals.
- Promoting mobility: doctoral programmes should tend to offer both geographical and interdisciplinary mobility, as well as international cooperation within a joint cooperation structure between universities and other partners. The joint study programme provides for mobility of both students and teaching staff in each partner institution in accordance with the study plan and an individual research plan developed for each doctoral student. In addition,solutions for an open study and research environment are provided for in the implementation of the Programme. **First of all**, RTA and ViA cooperate in the development and maintenance of open science resources (e.g. the website of scientific journals), which is especially relevant for doctoral students. **Secondly,** of the study courses will be acquired in the remote study mode allowing students to participate in the class regardless of their country of residence and geographical location. **Thirdly,** the research results of RTA are published on the open access website journals.rta.lv. and in the depository of RTA, which will start its work in January 2023.
- **Ensuring adequate funding: both development of high-quality doctoral programmes and successful completion of these programmes by doctoral students require adequate and regular funding.** At RTA, doctoral studies are financed from the

state budget, the doctoral students' own tuition fees and attracted project funding. Starting from 2023, doctoral students are expected to be recruited as non-elected research staff for scientific projects. This will meet the challenge announced in the Salzburg Recommendations Progress Report – a global vision for doctoral studies that provides for collaboration between doctoral students and the teaching staff employed in the programme regardless of geographical distance. According to the progress report, foreign doctoral students represent the access point for talented researchers contributing to the development of the future of European knowledge society. Therefore, it is important to integrate foreign doctoral students into the Latvian research environment, to appreciate their contribution to intellectual and cultural diversity and to support their development and career in Europe or even beyond. One foreign student who has graduated from RTA's bachelor's and master's study programmes is currently studying in the doctoral study programme "Modeling of Sociotechnical Systems".

The structure of study programmes at RTA is regulated by the Regulations on Development of Study Course Programmes approved by the Senat, which provide for the inclusion in the study course programme of such information as requirements for commencement of the study course, the body of knowledge, skills and attitudes (learning outcomes) to be acquired at the end of the study course, which correspond to the learning outcomes of the study programme and topics planned according to the volume and title of the study course, as well as individual work of students, requirements for assessment of learning outcomes to obtain credit points, literature and other organizational issues of the study course

To ensure the connection of the course content and outcomes with the aims and outcomes of the study programme:

1. Teaching staff plans course outcomes in accordance with specific outcomes of the study programme, which are reflected in the form of study course programme;
2. Teaching staff shall agree with the learning outcomes defined in the course with the director of the education programme who is responsible for setting learning outcomes in the study programme.

The study programme is developed so that the student is able to carry out his/her independent research work in cooperation with the supervisor of the doctoral thesis and so that the research topics are topical on a global, national and regional scale, as well as from the point of view of a certain sector of economy.

The study courses emphasize the acquisition of research methods, critical analysis, so that the student chooses the most appropriate methods for the research and the possibilities of the modern technological solutions. As a student will already know the topic of his/her thesis when starting studies, each study course will give an opportunity to analyse the specific topic, which will provide a broader view of the research topic in the end.

The mapping of the learning outcomes shows that the study courses and research/ scientific work develop the skills of synthesis and analysis, which are necessary to solve the problem chosen for the thesis and create new knowledge, as well as to supplement and strengthen the existing knowledge in today's changing conditions.

The mapping of the learning outcomes of the programme was performed in order to make sure that:

- the planned learning outcomes of the study courses correlate with the learning outcomes of the study programme;
- the topics in the study course programmes do not overlap;

- the defined outcomes of the study programme and study courses correspond to the objectives of higher education (personal development; preparation of active citizens for work in a democratic society; sustainable employment; development of an expanded knowledge base), the Latvian Qualifications Framework and the European Qualifications Framework.

Learning outcomes of the doctoral programme

By the end of the doctoral programme, students must possess comprehensive and analytical knowledge of scientific and industry-specific literature in the domain of sociotechical systems modelling/ engineering as well as good command of scientific methods and techniques applicable in scientific research. Students must be capable of demonstrating an original approach to the application of their knowledge, as well as practical understanding of how research and the respective results are applied to create and interpret the obtained data. Students must have a well-developed ability to perform critical assessment of the current research and techniques and methodology thereof, used in the course of planning and conducting research. A student must be able to plan and perform research at his/her own discretion, obtain results, summarise and present these.

Results of the study programme are formulated in adherence to the European Qualifications Framework (EQF) and the Latvian Qualifications Framework (LQF) level 8, third cycle qualification level of the Framework for Qualifications of the European Higher Education Area, as well as the goals and objectives of the Programme (see section 3.1.2).

The volume of the doctoral study programme "Modelling of Sociotechnical Systems" is defined in credit points (CP). The total amount of studies is 120 CP. 20 CP are theoretical classes (lectures, practical works, laboratory works and seminars), and 100 CP are attributed to the development of a doctoral thesis. The lengths of doctoral studies is 3 years in the form of full-time studies. Study work is carried out according to the individual study plan of each doctoral student:

- theoretical study courses: 20 CP
- Science sub-field special courses (A): 8K P
- Compulsory courses (A): 8 CP
- Elective courses (corresponding to the environment of the problem) (B): 4 CP
- Scientific-academic work: 100 CP
- TOTAL: 120 CP

The content of the courses is improved in accordance with the latest trends in the industry and the development trends of the science branch "Electrical engineering, electronics, information and communication technologies". The study programme includes the "GIS integrated solutions" course, as well as the subtopics offered within the advanced modeling special course. In order to develop the scientific-academic work, which is a part of the doctoral study programme, students develop the following skills:

- independent analysis of a scientific problem and determination of solution paths;
- application of research methodology and modern data processing technologies;
- acquisition of new scientific knowledge to promote the contribution of the sub-sector in solving problems;
- implementation of the proposed scientific solutions in the national economy, both on an international and national scale;
- ability to understand cross-sectoral issues, ability to generalize and adapt work results;
- ability to work in international projects and teams;
- development of doctoral thesis.

The acquired ability to analyze various systems (environmental protection, tourism, business

processes, computer networks, telecommunications, politics, public relations, etc.) with the help of simulation modeling, to analyze processes, to model and visualize them in an electronic environment as closely as possible to real life, allows to predict the development of various processes as accurately as possible in the future.

[1] Salzburg recommendations. https://www.eua-cde.org/downloads/publications/2016_euacde_doctoral-salzburg-implementation-new-challenges.pdf

3.2.2. In the case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels (if applicable).

By fulfilling the requirements of the joint doctoral study programme "Modeling of socio-technical systems" and by developing and publicly defending a doctoral thesis in the field of electrical engineering, electronics, information and communication technology, it is possible to obtain a scientific doctoral degree Doctor of Science (PhD) in electrical engineering, electronics, information and communication technologies. According to the Cabinet of Ministers regulations No. 1000 of 27.12.2005. both RTA and ViA have the right to confer doctoral degrees in electrical engineering, electronics, information and communication technologies for the period of accreditation of doctoral study programmes. The basic task of the doctoral study programme is to prepare scientists in the sub-sector of systems analysis, modeling and design of electrical engineering, electronics, information and communication technologies and to promote the application of students' theoretical knowledge, cognition, as well as research skills and research results.

When making a decision, the Sociotechnical Systems Modeling Promotion Council evaluates whether the conducted research has been developed independently and provides new scientific knowledge in the field of electrical engineering, electronics, information and communication technologies, as well as whether the research results published / accepted for publication in scientific journals that are anonymously reviewed are internationally available in repositories of scientific information and several are included in SCOPUS/Web of Science; whether the scientific results of the doctoral thesis have been reported in at least 3 international congresses, conferences or symposia; whether the applicant has participated in the implementation of scientific projects; or conducted research in cooperation with foreign scientific institutions, other scientific institutions or companies of Latvia.

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is implemented in a foreign language or in the form of distance learning, describe in detail the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

In the course of the Programme, the basic principles for the evaluation of the learning outcomes are based on European standards and guidelines (ENQUA) for quality assurance in the European Higher Education Area, which set out the main principles of the student-centred process. According to the ENQUA standards, RTA has developed the requirements and rules governing the formal evaluation. The most important of these for the doctoral studies are: Regulation of Examinations and Testing Session at RTA, Methodological recommendations for organizing students' independent work at RTA, Regulations on course examinations and tests, Outcome-Based Study Quality System of RTA, Plagiarism Control and Prevention Rules at RTA.

There are several basic principles for the implementation of studies: **quality** (for the academic staff (AS) it is the main factor facilitating significant intellectual and educational results), **synergy** (AS performs research-based academic activities), **accessibility** (AS is the most important study resource available to students), **motivation** (AS are motivated for development) and **ethics** (AS observe the academic and corporate ethics).

Both RTA and ViA recognise that the most important aspects of study quality are: **student-cantered study process**, **research process** focused on the society's demand for innovative products and services, **communicative process** involving knowledge and innovation exchange at the inter-university level; effective international academic and research cooperation and **technological process** targeted at access to high-quality, science-based higher education, introduction of new modern technologies in the study and research process (including distance learning).

The relatively small number of students in higher education institutions in general and in groups of students facilitates the possibility to take into account and respect students' contingent and the diversity of their needs, creating learning ways appropriate for them. The programme will be implemented by facilitating the doctoral students' aspiration for independence, while ensuring the guidance and support of teaching staff, as well as mutual respect in their relations. In each institution involved in the implementation of the programme, the program director shall ensure that:

- the teaching staff involved in implementation of the program know the methods of evaluation of learning outcomes and receive support for the development of their skills in this field;
- the evaluation criteria and methods, as well as criteria for awarding points, have been published in advance;
- the evaluation enables doctoral students to show the extent to which they have achieved the learning outcomes;
- doctoral students receive feedback, which, if necessary, provides advice related to the study and research process;
- evaluation is consistent, fairly applied to all doctoral students and is implemented in accordance with the approved study course descriptions.

Acquisition of the content of study courses takes place in lectures, practical works and independent work of doctoral students. The proportion between the hours allocated for lectures and practical classes is determined by the lecturer of the specific study course. The laboratories of the Faculty of Engineering are freely available to doctoral students for independent work 7 days a week. Each lecturer has 1 hour per week for student consultations. This time is precisely specified in the list of lecturers' consultations. Taking into account the specifics of the doctoral program, it is the performance of scientific research work, the doctoral student must also cooperate with the lecturers, the direct scientific supervisor or supervisors outside the official consultation hours. This

also applies to the close work of conducting research with master study level students and bachelor study programmes students.

The main emphasis in the implementation of the program is on a student-centered approach. In the student-centered approach, the study process is implemented as the main one, in which the doctoral student is given the opportunity to become a creator of his / her professional growth. In such an approach, the main function of the administrative and academic staff is to formulate an understanding of the student-centered approach and to provide support in the study process, actualizing the independence and responsibility of doctoral students. Cooperation between doctoral students and cooperation between lecturers and doctoral students is important.

The principles of student-centered education in the study program are provided:

1. evaluating the doctoral student's previous training and offering such study content that is most able to ensure the achievement of the study results of the study program.
2. offering flexible study paths, including observing the employment of students during studies, planning classes at a time convenient for students.
3. doctoral students are provided with full consultative support and full access to the study resources necessary to achieve the study results, including those available remotely.
4. doctoral students studies and research activities are focused on the development of their personality, including the development of their personality.

The considered spectrum of methods is applied in both languages of the study program - Latvian and English. And is the basis for achieving the results and goals of the study course and study program.

The basic task of the doctoral study programme is to prepare scientists in the sub-sector of systems analysis, modeling and design of electrical engineering, electronics, information and communication technologies and to promote the application of students' theoretical knowledge, cognition, as well as research skills and research results in the following problem environments:

- modeling of business and tourism information systems;
- planning of systematic regional development;
- modeling of the political system and public management;
- modeling of logistics information and transport systems;
- modeling of production processes;
- development of e-learning systems;
- improvement of simulation modeling technologies;
- application of simulation modeling methods for agricultural policy and analysis of sustainability;
- analysis of the sustainability of cyber security systems and the development and piloting of methods for assessing system security;
- interdisciplinary research in designing intelligent system methods and in assessment of energy efficiency.

Doctoral students of the study programme conduct research in the chosen sub-field of science, which determines the division of studies between the theoretical part (20 CP) and scientific-academic work (100 CP). Full-time study work is carried out according to an individual plan, which allows respecting each doctoral student’s scientific research activities of the related problem environment. The individual plan is approved by the thesis supervisor, the doctoral student and the programme director. The control of the implementation of the study plan is carried out by: the director of the doctoral study programme (quantitative control); scientific supervisor of the doctoral thesis (quality control).

The forms of theoretical classes are lectures, practical works, laboratory works and seminars, which are implemented both in a direct form and using electronic means of telecommunications. There are also courses that encourage student leadership and use active learning methods, where the course lecturer often becomes more like a mentor. The lecturer encourages to create one's own vision in the development of publications and learn from one's own mistakes. There are different ways of creating review papers, which can be chosen individually according to student's learning style. The topics of the independent work carried out in the study courses are adapted to the topic of the doctoral thesis within the limits of possibilities and according to the course plan, thus promoting the student-centered education process.

Academic work involves the preparation and management of practical and laboratory work in bachelor's and master's study programmes, while in the doctoral programme scientific work is realized by developing a doctoral thesis and participating in research projects. The doctoral student's scientific work is carried out under the supervision of the thesis supervisor. The annual number of peer-reviewed international publications included in international databases is used as a quantitative criterion.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the study programme is implemented in a foreign language, provide information on how internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

Not applicable.

3.2.5. Evaluation and description of the promotion opportunities and the promotion process provided to the students of the doctoral study programme (if applicable).

According to the amendments made by the Cabinet of Ministers to the regulations of December 27, 2005 no. 1000 "On Delegation of Powers to Confer the Doctoral Degree (Promotion) to Higher Education Institutions", RTA and ViA have the right to confer the doctor's degree in "Electrical engineering, electronics, information and communication technologies". Doctoral degree is confered for an independently developed and publicly defended doctoral thesis, which contains the results of original scientific research and provides new knowledge in the relevant branch of science. An applicant, who has successfully completed the academic part of an accredited doctoral study programme "Modeling of Sociotechnical Systems"or "Information Technology" and has prepared a doctoral thesis for defense, or whose academic activity performed outside of this programme is equated to it, taking into account the procedure provided for in the regulations approved by the Promotion Council of Modeling of Sociotechnical Systems and in accordance with the criteria set by the Cabinet of Ministers, and who has successfully passed the examinations envisaged in the doctoral study programme, has the right to defend the thesis.

Before submitting the thesis to the secretary of the Promotion Council of Modeling of Sociotechnical Systems, it is reviewed in the structural unit where the thesis was developed. If necessary, the work is initially reviewed by at least one lecturer with a PhD degree selected by the structural unit, who is an expert of Latvian Council of Science in the field of "Engineering and technologies: Electrical engineering, electronics, information and communication technologies". The work is then discussed in an open meeting of the structural unit. Structural unit then forwards the work for submission to the Promotion Council. The Promotion Council evaluates the work in accordance with the procedure established in the regulations of the Promotion Council and Cabinet regulations no. 1001 "Procedures and Criteria for the Conferral of a Doctoral Degree in Science" .

When making a decision in accordance with the requirements set out in the Council regulations and the regulations of the Council of Ministers No. 1001, the MSS Promotion Council evaluates: whether the conducted research has been developed independently and provides new scientific knowledge, or whether the research results have been published/ accepted for publication in scientific journals that are anonymously peer-reviewed or are internationally available in scientific information repositories and are included in SCOPUS/Web of Science, or the applicant has passed the doctoral examinations provided for in the doctoral study programme, or the scientific results of the doctoral thesis have been referred to at least 3 international congresses, conferences or symposia, or the applicant has supervised bachelor's or master's theses, or have has delivered lectures or conducted seminars at a university in the amount of at least one credit point, or the applicant has participated in the implementation of scientific projects, or conducted research in cooperation with foreign scientific institutions, other scientific institutions or companies of Latvia.

The doctoral thesis is defended in the joint RTA and ViA Doctoral Council.

3.2.6. Analysis and assessment of the topics of the final theses of the students, their relevance in the respective field, including the labour market, and the marks of the final theses.

Three doctoral theses have been defended in the joint doctoral study programme at RTA. The methodology developed in the doctoral thesis **METHODOLOGY FOR DETERMINING THE COMPATIBILITY OF CONCEPTUAL AND RELATIONAL DATA MODELS** offers a solution for automatically determining the compatibility of data models of different notations. This methodology has been developed by solving the task of determining the compatibility between the data model of the information system of the State Land Service of Latvia and the ISO international standard. Scientific innovation of the work: 1) developed methodology for matching relational data models with semantic ontologies; 2) the methodology contains a method and a tool for transforming relational data models into an ontology, a method and a tool for transforming UML geographic information profile class diagrams into an ontology. If only the transformation of data 9 models is required, these methods and tools can be used seperately from the other steps of the methodology; 3) the methodology is applicable not only in the field of geospatial data management and land administration, but also on a wider scale - in other fields where it is necessary to determine the compatibility between data models expressed in different notations. The theoretical value of the thesis: 1) a methodology has been developed for determining the similarity of conceptual data models with relational data models, which is based on the methods of comparing text lines. The methodology is easily extensible and applicable for determining the compatibility of data models of different industries; 2) a methodology based on semantic technologies has been developed for the transformation of legacy relational databases into semantic ontologies. With its help, it is possible

to identify the data at one's disposal and the requirements defined in international standards in order to create an ontology capable of defining the structure of geospatial information in a clearly understandable and shared form. The practical importance of the thesis: 1) the methodology for determining the compatibility of conceptual and relational data models on the State Land Service (SLS) databases has been developed and piloted with the aim of solving a technical task: determining the compatibility of the SLS database 10 with the land administration data model defined in the international standard; 2) the work offers practical solutions for automatic transformation of conceptual and relational data models to ontologies; 3) the ontologies of the international standard ISO 19152 [33] and SLS database have been developed as part of the work; 4) an ontology alignment tool was developed, which allows industry experts to manually or automatically determine the coincidence between the elements of two ontologies, resulting in alignments.

In the doctoral thesis METHODOLOGY OF DETERMINING AND IDENTIFYING CHANGES OF TOPOGRAPHIC OBJECTS, a methodology called "Energy Reduction Approach" (ERA) was developed. The methodology describes a conceptual model consisting of seven steps for recognizing an object in real-world images. It includes the entire technical process of image processing, starting from the method of image capture to the preparation of results for practical needs. It can be used not only for the recognition of topographical objects, but also for other tasks. However, the doctoral work was focused only on the recognition of topographical objects, which is related to the practical interests of the cooperation partner (SLS). In order to experimentally test the ERA methodology, two methods of object recognition were implemented: 1) the method of recognizing buildings in the cloud of laser scanning points; 2) the method of recognizing land surface types in orthophoto images. The building recognition method was tested as a high-performance computing solution (software prototype), which demonstrates the operation of the methodology and method. The solution enables to quickly identify specific places that have changed, collect statistical information about changes, coordinate survey works and operate with current information, reducing expenses, increasing the efficiency of work, improving the quality of work, and replacing expensive field surveys. According to the research request, the author has developed a mathematical model, which can be used to estimate the minimum necessary density of laser scanning points for the recognition of buildings, making recommendations and expressing a mathematical formula. Considering that the density of points is the main factor affecting the price of laser scanning, the developed formula and recommendations allow to choose the required density of points more precisely.

In the doctoral thesi AUTOMATED COMPARISON OF NATURAL LANGUAGES is an interdisciplinary scientific research in computer science, applied mathematics and linguistics, which offers the adaptation of methods used in the fields of computational linguistics to the field of linguometrics or dialectometrics. An innovative approach is proposed in the doctoral thesis: 1) taking speech istead of written language as a basis, thus significantly expanding the range of languages that might be under consideration and also making the methods more objective, independent of conventional notation systems; 2) new applications have been found for the methods used in other branches of computational linguistics (text classification, speech recognition, etc.), for example, a completely new approach is the generation of statistical models used in speech recognition from complete phonograms of informants instead of individual specific words, thus creating models that describe the given language in general; a new concept “phoneme space” has been introduced and described; there have been defined dimensions in which coordinates are assigned to all phonemes of Latvian and Latgalian dialects; anatomically and phonetically based metrics are defined (so far no one has combined both vowels and consonants in a single space with distances that correspond to intuitive understanding of the proximity of phonemes); 3)there have been obtained not only expected, but also unexpected experimental results, which can be

scientifically explained and substantiated; 4) a new metric - hierarchical choices - has been introduced (its compliance with metric axioms has been proven), which allows to perform a numerical comparison of binary trees obtained in the result of hierarchical categorization.

The approved doctoral students' topics of scientific work indicate several trends specific to the programme:

1) doctoral students are involved in RTA scientific projects and solve current industry problems in cooperation with scientists - supervisors of doctoral theses, e.g. in horticulture systems: I.Apeināns "Development of a decision-making system for smart fruit cultivation using autonomous drones" (supervisor assoc.prof. S.Kodors); T. Bartulsons "Application of machine deep learning for early diagnosis of plant diseases" (supervised by assistant professor S. Kodors); 2) doctoral students continue master's level research in an interdisciplinary section, especially in e-commerce and business systems: A. Demjanenko "Reducing business costs with the help of business process optimization" (supervisor Prof. A. Teilāns); A. Nikolajeva "Unsupervised machine learning technologies in personalization of e-commerce" (supervised by Prof. A. Teilāns); doctoral students solve current problems of socio-technical systems in their field of professional activity: 1) A. Rozentāle "Energy resources management and economy" (supervisor Prof. A. Teilāns); Rohit "Development of an e-learning platform with a neural network" (supervised by Prof. P.Grabusts).

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (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 the learning outcomes to be achieved by providing the respective examples.

The resources available for the study programme (including financial resources) and the material and technical support enable the qualitative implementation of the study programme and are adequate in relation to the study content and provide the successful organization of the study process.

The programme is implemented at the Faculty of Engineering of RTA in cooperation with ViA. The Faculty of Engineering of RTA was established in 1993. It implements four study fields ("Mechanics and Metalworking, Heat Power Industry, Heat Engineering and Mechanical Engineering", "Information Technology, Computer Equipment, Electronics, Telecommunications, Computer Control and Computer Science", "Architecture and Construction", "Manufacturing and Processing") and 15 study programmes: five first level professional higher education programmes, three professional bachelor study programmes, two academic master's study programmes, two professional master's study programmes and two doctoral study programmes.

At RTA, doctoral studies are organized by the relevant faculty, coordinated and controlled by the RTA Science Department and the Doctoral Commission. Currently, Latvia is gradually shifting to the model of Doctoral Schools.

The Faculty organises classes and guides the course of traineeship for students, organises

examinations, tests and annual doctoral student attestation, keeps record of the students' academic results, keeps and stores the students' personal files, organises the process of doctoral thesis defence. Science and project management department coordinates and controls doctoral studies: prepares information and documents regarding doctoral studies at RTA, performs assessment of informational and methodological bases. The Doctoral Commission: evaluates applications of doctoral students and prepares a proposal to the rector on allocating doctoral budget places to doctoral students of RTA; evaluates reports of doctoral students of RTA and prepares a proposal to the Programme Council for approval of the reports; examines the issues related to the doctoral study process and promotion and prepares recommendations or proposals for the improvement of the doctoral study process, approves doctoral students' individual work plans for the academic year, prepares proposals concerning approval of themes and scientific supervisors of doctoral students' doctoral theses, reviews draft normative documentation regulating the doctoral study process at RTA, and prepares proposals for the Joint Programme Council.

Doctoral studies are implemented in close cooperation with the **Institute of Engineering** (IE), which was founded in 2016 as a subdivision of the Faculty. IE oversees the operation of five research centres, 13 laboratories and other smaller units (see Fig. 3.3.1.1). The Institute of Engineering operates in the scientific domain of engineering science and technology. Activity areas of the Institute: electrical engineering, information and communication technology, machinery production and mechanical engineering, materials science and engineering, environmental and power engineering, other scientific and technological fields of engineering, including food and beverage technologies.

To strengthen the functions of science transfer in society, RTA operates a **Project Management and Technology Transfer Contact Point,** which ensures the involvement of RTA staff (including doctoral students) in projects and the correlation of research capacity with the challenges of industry transformation. Information about projects implemented by RTA is available on RTA's website https://www.rta.lv/aktualie_projektu_konkursi (information available only in Latvian)

RTA has provided an informative and methodological basis for the implementation of the Programme. The main information resources of RTA are:

1. RTA home page(rta.lv), which contains information about the faculty, study fields and programmes, the Institute for Engineering, and other information related to the study process (documentation of the study quality system, lesson schedules, etc.) and directly doctoral studies: doctoral study programmes, library services, conditions for publication in the collections of scientific articles of RTA, requirements for the development and design of a doctoral thesis, research topics of doctoral students, defended doctoral theses, Promotion Councils of RTA, binding normative documentation.
2. Internal Document Management System (DMS) of RTA for storing the normative documentation of RTA's structural units, which are available to all staff of RTA (employees and students).
3. Informative System of RTA, which is a part of the Information System for Universities of Latvia (LAIS), adapted to the needs of higher education institutions. RTA students and employees are ensured access to LAIS, which deals with management of student study and personnel, printout of prepared matriculation, ex-matriculation, registration instructions, changes in study data, changes in personal data and awarding scholarship orders, maintenance of course and study plan register, record keeping of student progress, preparation of diplomas and diploma supplements, etc.

The methodological basis of the study process is created in the e-environment https://ekursi.rta.lv/,

which also maintains the catalogue of study courses. In accordance with the Regulations on the development of study course / module descriptions at the RTA approved by the RTA Study Council, commencing the implementation of a study course to ensure quality thereof and organise the study process and independent work of students the lecturer ensures availability of study materials in the e-environment (on the website ekursi.rta.lv) and informs students about the content of the study course, the main study requirements and learning outcomes, indicating the address of the electronic website and the conditions of its use. Remote studies are ensured using mostly the Microsoft Teams platform. There is quality equipment is available for remote study process, seminars, conferences.

The RTA regulations on lecturers stipulate that a lecturer shall develop and place on the website ekursi.rta.lv for each his/her study course:

1. a description of the study course in accordance with the Regulations on the development of study course / module descriptions at the RTA approved by the RTA Study Council,
2. the content of the study course in accordance with the methodological recommendations for creating and maintaining the content of the study course on the website ekursi.rta.lv approved by the RTA Study Council
3. tasks for students' independent work in accordance with the methodological recommendations for organization of students' independent work approved by the Study Council,
4. requirements/materials of examinations/tests.

To support doctoral studies, RTA has prepared methodological materials available on the website:

1. information on doctoral study programmes implemented by RTA (programme parameters, content, admission requirements, job opportunities).
2. recommendations for the use of library funds in doctoral study programmes,
3. basic principles of ethics and use of publications,
4. conditions for the development of a doctoral thesis,
5. research themes for doctoral students,
6. doctoral theses defended at RTA,
7. Promotion Councils of RTA,
8. normative documentation regulating doctoral studies.

An important addition to the RTA science data management model will be the RTA institutional repository, which will start its work in January 2023.

3.3.2. Assessment of the study provision and scientific base support, including the resources provided within the framework of cooperation with other science institutes and higher education institutions (applicable to doctoral study programmes) (if applicable).

Taking into account that the Programme is a joint programme of RTA and ViA, the information given in sections 3.2.1 and 3.2.2 overlap. In order to avoid duplication of information, please evaluate the both sections jointly.

RTA has purposefully carried out modernization of the material and technical base for the engineering programmes, including attracting project funding. The sub-activities 3.1.2.1.1 "Modernization of premises and equipment of higher education institutions to improve the quality of study programmes, including providing the opportunities to acquire educational programmes also

for persons with functional disorders" "Construction of new Faculty of Engineering and laboratories at Rezekne Higher Education Institution, and purchase of equipment", project implementation period 15.04.2010 – 31.10.2015 (project number 010/0117/3DP/3.1.2.1.1/09/IPIA/VIAA/028). As a result of the project, 4 million euro worth laboratory equipment was purchased and EUR 5.8 million was invested in the construction of the new building of the Faculty of Engineering. The following laboratories were created and equipped:

1. equipment for the Physical Process Laboratory;
2. equipment for the Laboratory of electrical engineering, electronics and electric drive;
3. computer network and telecommunications training room;
4. equipment for the Laboratory of mechanical research of materials;
5. training room for Flow mechanics, pneumatics and hydraulics;
6. mechatronics training room;
7. training room for ecology and environmental protection;
8. equipment for the Laboratory of chemical processes;
9. equipment for the Laboratory of microbiology and biotechnology;
10. equipment for the Laboratory of eco-technologies;
11. training room for CAD/CAE/CAM;
12. mechanical workshop equipment;
13. equipment for sample preparation room;
14. equipment for the Laboratory of engineering geology and soil mechanics;
15. equipment for gas cylinder and compressor room;
16. equipment for the Laboratory of ensuring environmental health and human living conditions;
17. equipment for student creative workshop.
18. In the summer of 2014, there was opened the modern building of the Faculty of Engineering with modern equipment to facilitate the study and research process, in compliance with the European standards for education and science.

Operational Programme's "Growth and Employment" specific objective 8.1.1 "Increasing the number of updated STEM, including medical and creative industry, study programmes" within the project "Modernisation of the Study Programmes of Laser Technologies, Mechatronics, and Mechanical Engineering at the Rezekne Academy of Technologies", agreement on the implementation of a European Union fund project No. 8.1.1.0/17/I/011. Project costs are EUR 96 4917.00. Project implementation from 16.03.2018 until 31.12.2018. In the framework of the project, new equipment and devices (3D laser scanning microscope, magnetron sputtering system, laser equipment for cutting, welding, engraving, etc.), materials, tools in the field of laser technology were purchased, powerful computer equipment was bought, information and communication technology solutions were introduced into the study process (web conferencing equipment, simultaneous translation systems), the building of the Centre for Physical Processes and Laser Technologies was built. Information is available only in Latvian. http://lazers.rta.lv/lv/rezeknes-tehnologiju-akademija-pabeigts-studiju-programmu-modernizacijas-projekts/(only in Latvian)

The material and technical provision of the Faculty of Engineering of RTA is sufficient for the implementation of the doctoral study programme Sociotechnical Systems Modelling , sufficient to carry out research and scientific work in laboratory conditions for both doctoral students and academic staff.

The joint doctoral study programme is implemented in cooperation with **ViA Institute of Sociotechnical Systems Engineering**, which specializes in Virtual Reality Technologies, Visualization and Computer Vision, Sociotechnical Systems Modeling Technologies, E-Study Management and Technologies, Eco-Buildings and Smart Technologies of the National Economy, as

well as Mechatronics, which fully corresponds to joint programme profile. Students of the joint doctoral programme also have the opportunity to use ViA laboratories: **Computer network laboratory**, where it is also possible to carry out research related to various computer network technologies and computer network applications, which require the relevant hardware; **E-study management and technology laboratory**, which develops the architecture, engineering and technology of e-study solutions and knowledge creation and transfer processes, using information and communication technology, which helps to create in real-time and real-place available high-quality e-study solutions in individual, organizational and societal level; **Spatial research laboratory,** which provides support for the research of economic sectors using geospatial data; **Virtual and Augmented Reality Laboratory**, which is engaged in the development of interactive, three-dimensional (3D) scenarios and is oriented towards the use of Virtual and Augmented Reality (VR/AR) technologies.

3.3.3. Indicate data on the available funding for the corresponding study programme, its funding sources and their use for the development of the study programme. Provide information on the costs per one student within this study programme, indicating the items included in the cost calculation and the percentage distribution of funding between the specified items. The minimum number of students in the study programme in order to ensure the profitability of the study programme (indicating separately the information on each language, type and form of the study programme implementation).

The sources of funding for the study program will be the state budget funding and student tuition fees. Tuition fee is approved by the RTA Senate's decision for each subsequent study year. The cost of a study place in the doctoral study programme Modeling of sociotechnical systems is determined taking into account the basic cost of the study place, the level of the study programme, its duration, form, as well as the structure of the academic staff and field of studies, namely, 1 630.11 (basic cost of a study place) * 1.5 (minimum study cost coefficient) * 3 (study level coefficient)=EUR 7335.50 EUR

In general, the tuition costs for one full-time Latvian or EU student per year are estimated at EUR 7335.50, which does not exceed the costs of European states for the preparation of one student in a similar speciality.

The calculations of RTA show, that direct costs are EUR 5501.62/75%for one reference student per year; indirect costs (expenses for ensuring the operation of RTA, including the RTA library, land tax, lease of premises, rent, building operation costs, phone subscription and service costs, utilities, routine maintenance, special programmes, etc.) for 1 reference student per year are EUR 1833.87 /25 %, forecasting 2 and more students in one group.

The minimum number of students in the group is 5. If the number of students in the group is less than specified, the student group can be formed based on the calculations made by the financial analyst, which confirms that the planned income is sufficient for the minimum needs of the study program implementation.

Financial resources are used in accordance with estimates that are prepared by structural units and approved by Rector of RTA, as well as reviewed by the Council of the Faculty. The tuition fee is primarily used for ensuring the education process, co-funding projects, guest lecturer wages.

More information in the general description of the study direction in point 2.3.1.

The principles of mutual settlements in the joint doctoral study programme are stipulated in the agreement between ViA and RTA on the implementation of the joint programme. The agreement stipulates that, upon starting the implementation of the Programme, the Council approves the estimate and the funding calculation methodology for the full time of the implementation of the Study Programme. The estimate is created by the Financial Group of ViA according to the data received from the programme directors about the state budget funding available to each University, the expected number of fee-paying students, the number of credit points implemented in each University. By the agreement of the parties and at the programme directors' request, the estimate can be revised. The parties have agreed that not later than by the end of the current academic year the Council harmonizes and approves the Programme study plan for the next academic year, the lecturers involved in the Programme, as well as which University pays for the work of the particular lecturers involved in the implementation process. The payment to the lecturers and approved guest lecturers at the University is made by each University in accordance with the salary regulations at each University. The Parties agree that this fee set by the Parties also includes the fee for organizing seminars, exams, practical classes, etc. If it is necessary to pay for the work of a lecturer who has not been collaborating with any University before, the payment for the work shall be made by the University implementing the relevant study course.

3.4. Teaching Staff

3.4.1. Assessment of the compliance of the qualification of the teaching staff members (academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants) involved in the implementation of the study programme with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments. Provide information on how the qualification of the teaching staff members contributes to the achievement of the learning outcomes.

The planning issues of the RTA academic staff are subject to the Activity and Development Strategy of RTA 2016-2023, Academic Staff Development Plan of Rezekne Academy of Technologies 2018-2023. The issues related to the planning of the academic staff of the RTA are also subject to the Regulations on Academic Positions at RTA, the Regulations on the Lecturer of RTA, , Rules for Planning, Accounting, Control and Payment of Teaching Methodological Developments and Scientific Research , accounting procedure(Only in Lavian), Procedures for Planning and Accounting of the Amount of Study Work of Academic Staff of RTA, , Procedures of Evaluation of the Quality of Work of Academic Staff of the RTA (Only in Lavian), and other documents. The most important criteria for the selection of academic staff are scientific and professional competence. RTA implements a professional development program *Innovations in Higher Education*, where every year RTA teaching staff is offered up-to-date seminars on the latest trends in higher education and science.

The involvement of the teaching staff in the implementation of the Programme has been carried out taking into account the following criteria:

- scientific qualification (publications, participation in conferences, projects, rights of the expert of LCS, completed contract works);

- pedagogical qualification (supervision of doctoral and master's theses; development of study programmes, study courses, conducting classes, preparation of study materials, qualification improvement, conducting classes in foreign higher education institutions);
- organizational competencies (management of collegial institutions, participation in their work; organization of international conferences; editorial boards of scientific publications; management of an institutional unit, consultant);
- motivation of the teaching staff to work in a team with doctoral students.

Information about the academic staff is provided in the staff CVs (Appendix 10).

RTA and UR will involve in the implementation of the Programme the academic staff having high academic and research competence. RTA and UR are taking measures for the growth and improvement of the academic staff, facilitating the improvement of the staff's qualification:

1. application of technologies, including digital resources and innovations, in the study process,
2. acquisition of foreign languages at C1, B2 levels to ensure the internationalization and Study process,
3. in the didactics of higher education institutions and innovations in the issues topical to the higher education.

Guest professors and guest researchers will be invited to the study programme with lectures and seminars exactly on the sharing of gained research experience with doctoral students and current issues in research. The guest professors and researchers with whom RTA the consortium cooperates in research projects will be invited as a priority, as well as purposefully seeking an expert of the specific topic. Since representatives from partner universities in Poland, Spain, Germany, and Lithuania also participated in the development of the programme, there is an opportunity to invite teaching staff of these partner universities within the framework of the Modeling course.

The academic staff of the academic study programme meets the requirements specified in the third paragraph of the first part of Section 55 of the Law on Higer Education institutions - no less than five professors and associate professors elected at the relevant university participate in the implementation of the compulsory part and the limited elective part of the academic study programmes.

The joint academic staff of the doctoral study programme consists of seven elected professors and associate professors-

1. Prof. P. Grabusts (RTA, LSC expert in the sub-sector of systems analysis, modeling and design of the Information Technology industry)
2. Assoc. prof. Sergejs Kodors (RTA, LSC expert in Engineering and technologies - Electrical engineering, electronics, information and communication technologies)
3. Prof. Artis Teilans (RTA)
4. Associate Prof. Lienīte Litavniece (RTA, LSC expert in Social Sciences-Economics and Entrepreneurship)
5. Associate Prof. Arnis Cīrulis (ViA, LSC expert in Engineering and technologies - Electrical engineering, electronics, information and communication technologies)
6. Associate Prof. Kaspars Osis (ViA)
7. Prof. S. Cakula (ViA, LSC expert in Engineering and technologies - Electrical engineering, electronics, information and communication technologies)

In total, 14 teaching staff are employed in the joint programme. 10 (or 71%) have been elected to the academic positions of RTA and ViA, respectively, 4 are visiting lecturers - 3 from RTU (prof. J.Grundspenķis, prof. E.Ginters, doc. V.Shakele), one - from the University of West Bohemia in the

Czech Republic (M. doc. M.Kepka).

Updating and improving the quality of the academic and scientific staff working in the doctoral study programme is related to the participation of partners and, especially, foreign universities in the study programme. It promotes analogical understanding of quality assessment, opportunities for mutual recognition of formal assessments, joint academic and scientific work, and also an increase in the number of cooperation projects, which creates a basis for the growth of young scientists.

3.4.2. Analysis and assessment of the changes to the composition of the teaching staff over the reporting period and their impact on the study quality.

The basic composition of the academic staff in the joint doctoral study programme has not changed significantly. RTA professor P.Grabusts and prof. A. Teilāns have been working in the programme since its foundation. They are also supervisors of defended doctoral theses. Due to Prof. O. Užga-Rebrovs' retirement in 2022, the study course "Methods of risk modeling, assessment and management" is now delivered by assoc. prof. Lienite Litavniece. S. Kodors, who is the graduate of the programme and who is also the director of the Institute of Engineering and ensures the synergy of studies and scientific work by coordinating the involvement of teaching staff and doctoral students in scientific projects, kas also joined the teaching staff of the doctoral study programme.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals or peer-reviewed monographs may be additionally specified. Information on the teaching staff included in the database of experts of the Latvian Council of Science in the relevant field of science (total number, name of the lecturer, field of science in which the teaching staff has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

The number of publications of the academic staff involved in the programme varies from year to year. However, an increase in the total number and quality of publications can be observed. The total number of publications and notes for their inclusion in the databases can be seen in the publications inventory appendix, as well as in the lecturers' CVs.

The number of scientific publications of the academic staff involved in the implementation of the doctoral study programme during the reporting period (2017-2022)-

1. Prof. P. Grabusts: 13 - WoS CC; 18- Scopus
2. Asoc.prof. Lienīte Litavniece: 15 - Scopus, 14-WoS
3. Prof. Artis Teilāns: 8-Scopus, WoS -1
4. Asoc.prof. Sergejs Kodors:13-Scopus, WoS - 7
5. Asoc.prof. Arnis Cīrulis - 9

6. Asoc.prof. Kaspars Osis - 3
7. Prof. S. Cakula - 32
8. Visiting lecturer. Michal Kepka – 13
9. Lead researcher, Viesdoc. G. Majore - 11
10. Visiting prof. Jānis Grundspeņķis - 22
11. Visiting prof. Egils Ginters - 53

The geography of RTA teaching staff's scientific publications covers Latvia, Poland, Lithuania, Germany, Cyprus, and the journals of many other countrys. Sources of funding for publications come from RTA, ERAF, LSC, ArthrexGmbH, etc. funds of organizations and foundations.

The list of scientific publications of the academic staff involved in the implementation of the doctoral study programme during the review period can be found in the additional appendices.

Four faculty members elected at RTA and ViA have expert rights in the sub-sector of system analysis, modeling and design of the Information Technology field:

Prof. P. Grabusts (RTA, LSC expert in the sub-sector of analysis, modeling and design of systems of the Information Technology industry; until 05.10.2025) Areas of expertise: Intellectual data analysis, artificial neural networks, cluster analysis, fuzzy rules.

1. Assoc. prof. Sergejs Kodors (RTA, LSC expert in Engineering and technologies - Electrical engineering, electronics, information and communication technologies; until 06.10.2024) Areas of expertise: image recognition, classification, machine learning, deep machine learning, computer vision, remote sensing, geoinformation, laser scanning.
2. Associate Prof. Arnis Cīrulis (ViA, LSC expert in Engineering and technologies - Electrical engineering, electronics, information and communication technologies; until 01.12.2024) Areas of expertise: Virtual and augmented reality; Agent-based simulation modeling systems; Computer-aided design
3. Prof. S. Cakula (ViA, LSC expert in Engineering and technologies - Electrical engineering, electronics, information and communication technologies; until 31.03.2024) Areas of expertise: e-study technologies and management, machine learning algorithms, knowledge creation and transfer processes, information acquisition, processing and use in physical systems.

Visiting lecturers also have the right of LSC expert in Engineering and technology - Electrical engineering, electronics, information and communication technology:

1. Egils Ginters - until 31.03.2024; Areas of expertise: Simulation modeling; Modeling of discrete event systems and system dynamics simulations; Logistics information systems; Distributed simulation modeling environments; Agent-based simulation modeling systems; Display of data in e-learning systems.

2. Jānis Grundspeņķis - until 07.09.2025; Areas of expertise: systems theory, artificial intelligence, intelligent agents, multi-agent systems, intelligent learning systems, knowledge management, knowledge structure modeling

RTA Assoc.prof. Lienīte Litavniece is an LSC expert in Social Sciences-Economics and Entrepreneurship; until 03.11.2024. Areas of expertise: Regional development; development of local food products; zero-waste food consumption; tourism; tourism product offer, development, attractiveness, competitiveness; work-life balance.

3.4.4. Information on the participation of the academic staff, involved in the

implementation of the doctoral study programme, in scientific projects as project managers or prime contractors/ subproject managers/ leading researchers by specifying the name of the relevant project, as well as the source and the amount of the funding. Provide information on the reporting period (if applicable).

In the last 6 years, the academic staff involved in the Programme has actively participated in both scientific and applied projects. All projects involving academic staff make a significant contribution to the increase in academic competences, the transfer of project results and implementation thereof in the study and research process with students, which improves the quality of both lectures and research. Establishing cooperation contacts with new cooperation partners – both Latvian and international, is essential for projects. This enables development of not only own competencies, but also to ensure the development of new joint projects.

Artis Teilāns:

2019-2022 “Application of deep learning and data mining for the study of plant pathogen interaction: the case of apple and pear scab". Project no. lzp-2019/1-0094. Researcher. LSC funding EUR 299307.00.

2020. Research funded by the Ministry of Education and Science, Republic of Latvia, project ARTSS, project No. VPP-COVID-2020/1-0009. Researcher. State Budget of EUR 497,500.00.

2016-2017 State Land Administration and Rezekne Academy of Technologies Contract "IT expertise for Remote data sensing for State Land administration cadastres". Contract no. 7.6.3/76-2016. Project Manager. Financing EUR 489.00.

2014-2015 Lattelecom and Rezekne Academy of Technologies contract work "IT research". Contract No. LTC-14-000096. Project Manager. Financing 8608.37 EUR.

Pēteris Grabusts:

02.2016 – 12.2016, RTA scientific grant project "Development of the Oral History Archive of Rezekne Academy of Technologies". Lead researcher. Financing- EUR 2900.00.

2019 – 2020. LZP-2019/1-0094 “Application of deep learning and data mining for the study of plant pathogen interaction: the case of apple and pear scab". Researcher. LSC funding- EUR 299307.00.

Sergejs Kodors:

2020 - CURRENT. LZP-2020/2-0115 "E-mentor as a Transformation tool for Ensuring Zero-Waste Food Consumption in Educational Institutions". Researcher. LSC funding EUR 100,389.00.

2020. Contract research. "Laser scanning data processing using machine learning algorithms and GIS". Researcher. SLS budget EUR 2,183.98.

09/2020 – 12/2020. VPP-COVID-2020/1-0009 ARTSS: Advanced Resilience Technologies for Secure Service. Researcher. State Budget EUR 497,500.00.

01/2019 – CURRENT. LZP-2019/1-0094 Application of deep learning and datamining for the study of plant pathogen interaction: the case of apple and pear scab". Chief Executor, RTA Working Group Coordinator. LZP financing EUR 299307.00.

2018. "Effects of structural and social change on municipalities in Germany and the Baltic States (CliMBinG)", Baltisch-Deutsches Hochschulkontor. Researcher. Association "Baltic - German University Office", 1604.65 EUR.

2017. RTA scientific grant project "Evaluation of tourism products of Rezekne county (quality audit)" No. 13.15/4, management of the sub-module "Visualization of accommodation services and recreation places and software development". Researcher. Financing- EUR 2700.00.

2016. Pilot project "Expert and research service for remote sensing data processing of State Land Service structures", Rēzekne Academy of Technology and State Land Service. Expert, researcher. SLS funds EUR 592.00.

Imants Zarembo:

Lzp-2021/1-0134 “Development of autonomous unmanned aerial vehicles based decision-making system for smart fruit growing”(03.01.2022 – 30.12.2024). Project leader, leading researcher. LSC funding EUR 299999.70.

VPP-COVID-2020/1-0009 “Advanced Resilience Technologies for Secure Service.” (01.07.2020-31.12.2020). Researcher. Funding of VPP "Mitigation of the COVID-19 consequences" EUR 497,500.00.

Lzp-2019/1-0094 Application of deep learning and datamining for the study of plant-pathogen interaction: the case of apple and pear scab. (01.01.2020 - 31.12.2022). Researcher. LSC funding 299307.00 EUR***

Ginta Majore

2019-2023. The project “reSilienT fARminG by Adaptive microcimaTe managEment -STARGATE”, Total project budget: EUR 6,994,405.00, Project financier: European Commission

2021-2023. Advances: increasing the cyber security capabilities of society. Grant: Total budget of the European Project: 999130.07 Project financier: Baltic Research Program of the Financial Instrument of the European Economic Area

2022-2025. Project "Taking over the experience in modeling environmental data and dynamic systems in Latvia" (TED4LAT) Project total budget: 1120000.00 Project financier: European Commission

2020. Project “Advanced Resilience Technologies for Secure Service.” (ARTSS) of the state research programme "Covid-19 mitigation". Development of virtual reality content and integration of functionality in e-study platforms. Total project budget: 497500.00 Project financier: Latvian Science Council.

2014. In the scientific grant project financed by the municipality of Valmiera "Development of a simulation model and software prototype for assessing the use and sustainability of natural resources in households in the area of protected landscapes.” Total budget of the project: 10,000. Project financier: Municipality of Valmiera.

2016. In the scientific grant project financed by the municipality of Valmiera "Development of a prototype of simulation model and platform-connectable software for long-term analysis and monitoring of energy resource consumption of municipal facilities" Total budget of the project: 10,000. Project financier: municipality of Valmiera.

2021-2023 Strengthening the academic staff of higher education institutions in strategic specialization areas at RTA, VUAS and ViA. Total project budget: 408,852 EUR Project financier: European Social Fund.

Arnis Cīrulis

2021 - 2022 Scientific manager of the project "Virtual reality platform for safety training of

construction workers", LIAA (KC-PI-2020/64). Total project budget: 299821.50 Project financier: Investment Development Agency of Latvia

2021. Scientific manager of the project “Visualisation of real-time bog hydrological regime and simulation data in virtual reality” (BogSim-VR)", LZP (No. lzp-2020/2-0396). Total project budget: 100389.00 Project financier: Latvian Science Council

2017-2019 VIAA Post-doc grant project no. 1.1.1.2/VIAA/1/16/105 “Dynamic 3D visualization of the Internet of Things (IoT) elements in outdoor augmented reality (AR) modes.” Total project budget: 133415.09 Project financier: VIAA

2016.-2017. The author and manager of the scientific grant project "Online augmented reality system prototype for animated 3D models" funded by the municipality of Valmiera. The total project budget: 10,000 Project financier: Valmiera city municipality

2015.-2016. Erasmus Mundus Action 2; MID Mobilities for Innovation and Development, University of Turku, Finland. Reserch topic "Visualization and virtualization of simulation modelling data for various economics domains". Grant agreement 2012-2742/001-001-EMA2 939/25/2012. Project budget: 15000 Project financier: European Commission

2014-2015 The author and manager of the scientific grant project "Designing an interactive 3D environment for learning anatomy from computed tomography images" funded by the municipality of Valmiera. Total project budget: 10,000 Project financier: Valmiera city municipality

2013-2014 Author and manager of the scientific grant project "Visualization of virtual buildings in real space for urban planning (City 3D-AR)" funded by the municipality of Valmiera. Total project budget: 10,000 Project financier: Valmiera city municipality.

Kaspars Osis

2015–2016. Author and manager of the scientific grant project "Development of Lifelong education guidelines for 2016-2020 in the Vidzeme region and creation of a technological solution prototype". Total project budget: EUR 10,000. Project financier: Municipality of Valmiera

Michal Kepka

AFarCloud - Aggregate Farming in the Cloud. 2018-2021. ECSEL Joint Undertaking, Project partner team leader. Total project budget: €26,568,727.39 Project financier: European Commission

SmartAgriHubs - Connecting the dots to unleash the innovation potential for digital transformation of the European agri-food sector. 2018-2022. H2020-EU.3.2.1.3. Project partner team leader, technical manager of innovation experiment. Total project budget: €22,400,850.78 Project financier: European Commission.

PoliRural - Future Oriented Collaborative Policy Development for Rural Areas and People. 2019-2022.H2020-RUR-2018-2 Project partner team leader. Total project budget: € 5,999,875.28 Project financier: European Commission.

Sieusoil - Sino-EU Soil Observatory for intelligent Land Use Management. 2019-2022.H2020-SFS-2018-2 Project partner team leader. Total project budget: € 6,875,350 Project financier: European Commission.

Peregrinus Silva Bohemica - Multimedialá a digital turistický guide pro přeshraniční historico cesty v Bavorském lese a na Šumavě. 2016 – 2019. Evropská komise-Strukturální fondy, projekt č. 60. Technical management. Total project budget: EUR 1,315,053.96 Project financier: European Commission.

Egils Ginters

2017 – 2021 FLAG-ERA FuturICT 2.0 "Large scale experiments and simulations for the second generation of FuturICT" Project type: Horizon 2020 Group leader, Total project budget: € 2,614,527

2011 – 2015 FP7-ICT-2011-7 IP FUPOL No. 287119 "Future Policy Modeling (IP)" 10.11.2021 © European Union, 2002-2021 | http://europass.cedefop.europa.eu Page 5/26 Work package manager Project type: FP7 Total project budget: €9,102,880

Jānis Grundspeņķis

2014 – 2017. Sub-project manager of national research program SOPHIS project "Ontology-based knowledge engineering technologies suitable for web environment".

2013 – 2016. Project manager of LCS project "Development of models and methods for applied intelligent software based on distributed artificial intelligence, knowledge management and advanced web technologies" .

Lienīte Litavniece

2022 – CURRENT “Application of deep learning and datamining for the study of plant-pathogen interaction: the case of apple and pear scab” (lzp-2021/1-0134) Leading researcher. Project total budget: 299999.70 EUR

01/10/2020 – 31/12/2020. Lead researcher of VPP “Life with COVID-19: Evaluation of overcoming the coronavirus crisis in Latvia and recommendations for societal resilience in the future “(COVIDlife)"(No.VPP-COVID-2020/1-0013)" Total project budget: 497,580 EUR

2018 RTA Manager, researcher of scientific grant for research "Quality assessment of Rezekne city catering companies" (No. 16.7/11)

2018 Project manager of the project "Effects of structural and social change on municipalities in Germany and the Baltic States (CLIMBING)" project financed by the Baltic - German Higher Education Office (No. 2018/5)

2017 Manager, researcher of the RTA scientific grant for research “Maintenance and renewal of the cultural and natural heritage in Riebini municipality” (No. 13.15/5)

2017 Manager, researcher of the RTA scientific grant for research "Assessment of tourism products in Rezekne municipality (quality audit)" (No. 13.15/4)

2016 Manager, researcher of RTA Scientific grant for research “Feasibility study of tourism product development for the Luznava Manor” (No. 13.15/2)

2016 RTA scientific grant for research “Assessment of opportunities for development of acommodation services in Rezekne city” (No. 13.15/12)

3.4.5. Assessment of the cooperation between the teaching staff members by specifying the mechanisms used to promote the cooperation and ensure the interrelation between the study programme and study courses/ modules. Specify also the proportion of the number of the students and the teaching staff within the study programme (at the moment of the submission of the Self-Assessment Report).

The planning of cooperation of the teaching staff and ensuring the interconnection of study courses

in the programme at several levels:

First of all, inter-institutional cooperation of the teaching staff is coordinated **by the Study Programme Council. I**n accordance with the cooperation agreement between RTA and ViA and according to the procedures specified in the regulatory documents of each university, the Council consists of 6 people, 3 of whom are appointed by RTA, 3 – by ViA. Council will evaluate and update the content of the study programme according to the development trends in the field, societal needs, workload of doctoral students, study progress and graduation, satisfaction of doctoral students with the corresponding study programme, support provided by the higher education institution in studies, the research environment and its compliance with the objective of the study programme. The Council shall establish common requirements for the implementation of the programme, final examinations, and shall ensure that the parts of the programme create a coherent in terms of content and consecutive joint programme. The Council shall establish the quality system of the programme and supervise its operation, involving teaching staff and doctoral students in this process, ensure the mobility of teaching staff.

Secondly, the cooperation of the teaching staff in implementation of the study courses. The cooperation of the teaching staff in the study courses taught by several lecturers is particularly important. There are three study courses of this type in the study programme. For example, “Research methodology and modelling data processing I, II” (4 KP) is delivered by one professor from RTA and one from ViA. On the other hand, 9 lectures, who provide flexible study content corresponding to the doctoral student's research topics, are involved in the implementation of "Sectoral Modeling". Therefore, it requires a coordinated and purposeful cooperation in the team of lecturers. Before the start of the study course, communication between the lecturers is planned during the implementation of the study course. The cooperation with the teaching staff of Rezekne Academy of Technologies, which started in previous reporting periods, is being continued. The cooperation is a successful tool not only in the implementation of courses and managing doctoral theses, but it also continues the initiated cooperation within the framework of monthly seminars for doctoral students. On average, once a month, but not less than once a semester, joint seminars for doctoral students are held, in the framework of which not only the teaching staff of Vidzeme University of Applied Sciences and Rezekne Academy of Technologies, but also various guest lecturers give presentations on various current topics within the field. For example, some of the guest lecture topics presented during the seminars - "Communication of science", "Microsoft tools for support of research work", "Simple and complex applications of artificial intelligence", "Options of GIS in modern research (examples, tools)", "Introduction to research, processes . Using LaTex, Overlief platform. Use of library resources", "Experiences in utilization of GIS and spatial data visualization in international research projects", "Economic and mathematical methods and models for use in research". During doctoral seminars, doctoral students also present their thesis topics and their progress, where they have the opportunity to get feedback from experienced professors and researchers. In a similar way, on average once a year, winter/summer schools for doctoral students are jointly organized, including the participation of local and international guest lectures, as well as presentations by doctoral students on the topics of doctoral theses. Summer schools are an important model of cooperation, because it brings together scientists and industry representatives of Latvia and foreign institutions, e.g. A. Kapenieks (RTU), J. Binde (CEO of LMT, Professor of ViA), A. Brilingaite, L. Bukauskas (Vilnius University, Institute of Computing)), doctoral students from RTU, LiepU, Vilnius University. These winter/summer doctoral schools are highly appreciated by doctoral students, because often during this time, thanks to discussions and feedback, doctoral students manage to progress more successfully in the development of their doctoral thesis.

Thirdly, the cooperation of teaching staff in the development of joint scientific research.

All the teaching staff members employed in the study programme have experience in the preparation of joint publications, including preparation of joint publications of lecturers and students. This experience is strengthened at the International Scientific and Practical Conference of the Faculty of Education of RTA “Environment. Technologies. Resources”, which is organised once every two years, where students and teaching staff share their experience and present their research results.

Fourthly, **cooperation in scientific projects.** A review of the involvement of the RTA teaching staff in scientific projects is available in the CVs of the participating staff.

Fifthly, both parts involved in the implementation of the study programme have agreed on a common mechanism for providing study material to students through cross-platform connections.

The ratio of students to teaching staff in the study program is considered according to the OECD methodology, dividing the full-time equivalent (FTE) of doctoral students in the program (1,8) by the full-time equivalent of the teaching staff employed in the program FTE (0,1). At the time of submitting the self-assessment in 2022 the ratio of teaching staff to students is 17, which slightly exceeds the average of Latvia (14), EU countries (14) and OECD countries (15) in higher education programmes in the public higher education sector and coincides with Latvia's indicator (18) in the private higher education sector in bachelor's, master's and doctoral level programmes . [1].

[1] Education at Glance 2022. https://ej.uz/h1x9

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Annex 1.docx	1.pielikums.docx
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)	Annex 2.docx	2.pielikums.docx
Statistics on the students in the reporting period	Annex 3.docx	3.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)	Annex 4.doc	4.pielikums.doc
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Mapping.xlsx	Kartēšana.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	SSMd_plans_2023_2024_ENG.xlsx	SSMd_plans_2023_2024_LV.xlsx
Descriptions of the study courses/ modules	KursuApraksti_ENG.zip	KursuApraksti_LV.zip
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)	0-Apliecinajums-Par SSMd akademiska personala sastavu SSMd LV ENG-signed.edoc	0-Apliecinajums-Par SSMd akademiska personala sastavu SSMd LV ENG-signed.edoc
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	atbilstība 55-3_AL_ENG.edoc	atbilstība 55-3_AL_LV.edoc

Electronic Commerce Information Systems (45483)

Study field	*Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science*
ProcedureStudyProgram.Name	*Electronic Commerce Information Systems*
Education classification code	*45483*
Type of the study programme	*Academic master study programme*
Name of the study programme director	*Sandra*
Surname of the study programme director	*Ežmale*
E-mail of the study programme director	*Sandra.Ezmale@rta.lv*
Title of the study programme director	*Asoc.prof., Dr.oec.*
Phone of the study programme director	*+371 29227268*
Goal of the study programme	*to prepare competitive top-level and middle-level managers in electronic commerce information systems, to prepare students for independent scientific activity in the field of information technology and electronic commerce, and to orient students to doctoral studies.*
Tasks of the study programme	*1. to ensure in-depth study of fundamental and theoretical courses in the field of information technology and electronic commerce areas, as well as to prepare theoretically educated specialists for scientific and professional activities;* *2. to apply an interdisciplinary approach to learning theoretical and practical courses, which provides knowledge in computer science, information technology, economics and management science;* *3. to deepen and strengthen theoretical and methodological knowledge in the field of electronic commerce and information systems, including the development, implementation and maintenance of the electronic commerce technology system (ECTS), as well as issues of business management, communication, human resource management and marketing;* *4. to develop the ability to use knowledge in solving specific theoretical and practical issues, propose and test hypotheses, as well as compare and critically evaluate various theories of information technology, economics and management science;* *5. to promote students' independent scientific research based on the latest scientific findings.* *6. to orient students to doctoral studies;* *7. to prepare competitive specialists for the labor market, providing professional skills and abilities in the planning, development and implementation of electronic commerce products and services, applying the latest technological achievements in the field of information technology.*

Results of the study programme	*1. is able to demonstrate in-depth or expanded knowledge and understanding in electronic commerce information systems, some of which correspond to the latest findings of the relevant scientific branch or professional field and which provide a basis for creative thinking or research, including working in contact with different fields;* *2. is able to independently use the theory, methods and problem-solving skills of electronic commerce information systems to perform research activities or highly qualified professional functions, as well as is able to reasonedly explain and discuss complex or systemic aspects of the information technology industry or professional field both with specialists, both with non-specialists;* *3. is able to independently advance the improvement and specialization of their competences, take responsibility for the results of the work of personnel groups and their analysis, conduct business, innovations in the information technology sector, carry out work, research or further learning in complex and unpredictable conditions and, if necessary, transform them using new approaches.* *4. is able to independently formulate and critically analyze complex scientific and professional problems, justify decisions, and, if necessary, perform additional analysis of electronic commerce information systems;* *5. is able to integrate knowledge from different fields, contribute to the creation of new knowledge, development of research or professional activity methods, show understanding and ethical responsibility for the possible impact of scientific results or professional activity on the environment and society;* *6. ability to develop requirements for IT solutions and develop these solutions as a result of economic process analysis.*
Final examination upon the completion of the study programme	*Master Thesis*

Study programme forms

Full time studies - 2 years - latvian

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*80*
Admission requirements (in English)	*Academic bachelor's degree (duration of studies at least 3 years (120KP) or second-level professional education in electronic commerce or computer science or information technology, economics or social sciences. For studies in English: a certificate of proficiency in English at least at B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Master of Science in Computer Systems*
Qualification to be obtained (in english)	*-*

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

Full time studies - 2 years - english

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*0*
Language	*english*
Amount (CP)	*80*
Admission requirements (in English)	*Academic bachelor's degree(duration of studies at least 3 years (120KP) or second-level professional education in electronic commerce or computer science or information technology, economics or social sciences. For studies in English: a certificate of proficiency in English at least at B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Master of Science in Computer Systems*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

Full time studies - 1 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*60*
Admission requirements (in English)	*Professional bachelor's degree (duration of studies at least 4 years (160KP) or second-level professional education in electronic commerce or computer science or information technology, economics or social sciences. For studies in English: a certificate of proficiency in English at least at B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Master of Science in Computer Systems*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

Full time studies - 1 years, 6 months - english

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*english*

Amount (CP)	*60*
Admission requirements (in English)	*Professional bachelor's degree (duration of studies at least 4 years (160KP) or second-level professional education in electronic commerce or computer science or information technology, economics or social sciences. For studies in English: a certificate of proficiency in English at least at B2 level.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Master of Science in Computer Systems*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Rēzekne Academy of Technologies	RĒZEKNE	ATBRĪVOŠANAS ALEJA 115, RĒZEKNE, LV-4601

3.1. Indicators Describing the Study Programme

3.1.1. Description and analysis of changes in the parameters of the study programme made since the issuance of the previous accreditation form of the study field or issuance of the study programme license, if the study programme is not included on the accreditation form of the study field, including changes planned within the evaluation procedure of the study field evaluation procedure.

Parameters of the study programme – title, code, place of implementation not been changed. The programme director is Dr. oec. assistant professor Sandra Ežmale.

Admission requirements:

For the 2-year program option:

Academic bachelor's degree (duration of studies at least 3 years (120KP)) or second-level professional education in electronic commerce or computer science or information technology, economics or social sciences.
For studies in English: a certificate of proficiency in English at least at B2 level.

1 year 6 months for the program variant

Professional bachelor's degree (duration of studies at least 4 years (160KP)) or second-level professional education in electronic commerce or computer science or information technology, economics or social sciences.
For studies in English: a certificate of proficiency in English at least at B2 level.

Degree to be awarded have: Master of Science in Computer Systems

Two master's study programmes have been implemented in the study direction - "Electronic commerce information systems" (47483) and "Computer systems" (code 47483). After evaluating the programme implementation course, the Board of Studies and the Council of the Faculty of Engineering made a decision to close professional master's study programme "Computer Systems" and to concentrate resources on the improvement of the academic master's study programme "Electronic Commerce Information System". This decision was determined by several circumstances: 1) the academic master's study programme is more flexible in terms of both content and admission requirements and is able to ensure strategic connection with other study directions implemented by RTA; 2) the academic orientation of the study programme provides a basis and encourages to pursue doctoral studies, 3) compared to the professional master's study programme "Computer Systems", the academic master's study programme has a more stable number of students in the reference period.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree, professional qualification/professional qualification requirements or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of

the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

The title, aim, tasks, learning outcomes of the academic master´s study programme "Electronic Commerce Information Systems" and the master´s degree to be obtained in engineering sciences are interrelated. The programme corresponds to the study direction of Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science. According to the LR education classification, the Programme belongs to **the thematic group** of natural sciences, mathematics and information technologies, to the thematic field of education Computing (code numbers 48) and to the education programme group Computer systems, databases and computer networks (code numbers 483). In terms of branches of science, the programme corresponds to the sub-branch of Systems analysis, modeling and design of the branch of Electrical engineering, electronics, information and communication technologies of the Engineering Sciences and Technologies group. Taking into account the possible variability of the systems, the master's study programme is interdisciplinary. The main points of contact are with the thematic group "Social sciences, commercial studies and law" in the thematic field of education "Social and human behavior sciences" in the education programme group "Economy" and "Commercial studies and administration" in the education programme group "Management and administration".

Accordingly, **the aim** of the study programme is to prepare competitive top-level and middle-level managers in electronic commerce information systems, to prepare students for independent scientific activity in the field of information technology and electronic commerce, and to orient students to doctoral studies.

The **objectives of** the programme are as follows:

1. to ensure in-depth study of fundamental and theoretical courses in the field of information technology and electronic commerce areas, as well as to prepare theoretically educated specialists for scientific and professional activities;
2. to apply an interdisciplinary approach to learning theoretical and practical courses, which provides knowledge in computer science, information technology, economics and management science;
3. to deepen and strengthen theoretical and methodological knowledge in the field of electronic commerce and information systems, including the development, implementation and maintenance of the electronic commerce technology system (ECTS), as well as issues of business management, communication, human resource management and marketing;
4. to develop the ability to use knowledge in solving specific theoretical and practical issues, propose and test hypotheses, as well as compare and critically evaluate various theories of information technology, economics and management science;
5. to promote students' independent scientific research based on the latest scientific findings.
6. to orient students to doctoral studies;
7. to prepare competitive specialists for the labor market, providing professional skills and abilities in the planning, development and implementation of electronic commerce products and services, applying the latest technological achievements in the field of information technology.

The outcome of the studies is a specialist in electronic commerce information systems with a master's degree in information technology, whose level of theoretical knowledge and practical skills allow to start independent scientific research work, continue education in doctoral

study programmes in computer science and information technology sciences, as well as independently and systematically improve knowledge and skills to adapt to professional activity in changing labor market conditions, i.e.:

1. is able to demonstrate in-depth or expanded knowledge and understanding in electronic commerce information systems, some of which correspond to the latest findings of the relevant scientific branch or professional field and which provide a basis for creative thinking or research, including working in contact with different fields;
2. is able to independently use the theory, methods and problem-solving skills of electronic commerce information systems to perform research activities or highly qualified professional functions, as well as is able to reasonedly explain and discuss complex or systemic aspects of the information technology industry or professional field both with specialists, both with non-specialists;
3. is able to independently advance the improvement and specialization of their competences, take responsibility for the results of the work of personnel groups and their analysis, conduct business, innovations in the information technology sector, carry out work, research or further learning in complex and unpredictable conditions and, if necessary, transform them using new approaches.
4. is able to independently formulate and critically analyze complex scientific and professional problems, justify decisions, and, if necessary, perform additional analysis of electronic commerce information systems;
5. is able to integrate knowledge from different fields, contribute to the creation of new knowledge, development of research or professional activity methods, show understanding and ethical responsibility for the possible impact of scientific results or professional activity on the environment and society;
6. ability to develop requirements for IT solutions and develop these solutions as a result of economic process analysis.

The structure of the study programme and the content of the study courses ensure achievement of all learning outcomes.

The study programme has been implemented since 2013. Student admission to the study programme takes place through competition, taking into account the average grade in the diploma supplement. Admission requirements have not changed fundamentally within last five years. An applicant can be enrolled if he/she has obtained a professional or academic bachelor´s degree (duration of studies at least 3 years (120 CP) or second level professional education in electronic commerce or computer science or information technology, economics or social sciences.

In order to select the most competent and motivated graduate students, including the competences required for studying at foreign partner institutions, the admission requirements have additional items:

1) for publications in the field of electronic commerce or related industries in scientific editions or professional magazines (copies of publications must be submitted) – 0.5 points (for each);

2) for participation in conferences with a report or a poster report (copies of certificates of participation in conferences must be submitted) – 0.25 points (for each).

The admission requirements and the additional points awarded within these requirements facilitate admission for students who have acquired previous education in a related field, as well as those who have started research work.

The amount of credit points and content of the study programme corresponds to Cabinet Regulation No.240 *Regulations for the State Academic Education Standards* of 13 May 2014. Its

volume is 60 CP (90 ECTS) or 80CP (120 ECTS), the duration of implementation is 1,5 or 2 years. The knowledge, skills, and competences defined in the programme which form the content of the engineering master’s degree in Electronic Commerce Information Systems can be fully acquired in this period.

3.1.3. Economic and/ or social substantiation of the study programme, analysis of graduates' employment.

According to Latvia's report to the United Nations (UN) on the implementation of the Sustainable Development Goals in Latvia, the biggest challenges are related to strengthening an innovative and eco-efficient economy, as well as reducing inequality of income and opportunities. On the other hand, ensuring the availability of labor force, increasing productivity and investment in research and innovation, as well as using the potential of the digital environment and introducing the concept of a data-based society have been emphasized as the biggest challenges for the development of the national economy. Therefore, the development of human capital and an innovative, digital and eco-efficient economy is a prerequisite for increasing competitiveness and productivity of Latvia in the context of both the UN Sustainable Development Goals and Sustainable development strategy of Latvia until 2030.

According to the informative report of the Ministry of Economy "On medium and long-term forecasts of the labor market" 2020, there is a large shortage of highly qualified information and communication technology (ICT) specialists. The report states that by 2027, the shortage of highly qualified specialists in mathematics, science, technology and engineering may increase to approximately 14 thousand. It is expected that in 2040, the demand for labor force in the field of ICT will exceed the supply. The long-term labor market forecasts of the Ministry of Economy on the employment needs in terms of professions and education up to 2040, indicate the wider use of various technologies and innovations in everyday life, and thus the demand for qualified information technology specialists. According to CEDEFOP data, from 2020 to 2030 the number of employees in the ICT sector will increase every year by 0.9% in 27 EU member states.

According to the World Economic Forum's research "*The Future Jobs Report 2020*", there have been significant changes in labor demand, skills and knowledge over the past five years. The most in-demand interdisciplinary and specialized skills of the futureare as follows:

1. in product marketing - data and artificial intelligence (hereinafter - AI), product development, sales;
2. in digital marketing content - data and AI, marketing, product development, sales;
3. software development life cycle (SDLC) - cloud computing, data and artificial intelligence, engineering, marketing, product development;
4. in data storage technologies - cloud computing, data and artificial intelligence, engineering, product development;
5. in computer networks - cloud computing, data and artificial intelligence, engineering, sales;
6. in web development- cloud computing, content, engineering, marketing. Therefore, the most demanded knowledge and skills in the future will be data analysis, computer programming; general statistics; leadership and management; machine learning, Big Data and Python programming.

Due to the Fourth Industrial Revolution (4.0) and the COVID-19 pandemic, digitization has developed rapidly, including the shift to remote work and the growth of e-commerce. So, for

example, in Latvia, with the development of e-commerce during the pandemic, the proportion of companies that sell goods or services on the Internet has increased. According to CSB survey data, in 2020, compared to 2019, this indicator increased by 1.6 percentage points, reaching 17, 1%. 58.6% of all the companies engaged in e-commerce indicated that they tried to increase or start selling goods or services on the Internet under the influence of Covid-19. The largest number of such companies making up 64.1% was in the group of medium-sized companies. In the group of large companies, 58.6% stated that they had tried to increase and develop e-commerce, while in the group of small companies, the proportion of such companies was 57.3%.

Companies are also ready to accelerate the digitization of work processes, the expansion of remote work, as well as the automation of tasks. 84% of employers are ready to promptly digitize their work processes in order to enable 44% of the workforce to work remotely.

The academic master's study programme "Electronic Commerce Information Systems" provides students modern knowledge, skills and competencies in accordance with the demand trends of the economy and the labor market, thus allowing them to successfully operate in companies of different industries.

During the reporting period (since 2017), 44 graduates have graduated from the study programme. Almost all the graduates are employed (SEA has information about 2 job seekers who graduated from the study programme). Two graduates continue their studies in RTA doctoral study programme "Modelling of Sociotechnical Systems". The graduates, who have obtained a master's degree, work in different companies of various sectors, such as the financial sector, ICT companies, state administrative institutions, including Visma Lab, Latvian road maintainer, Central Finance and Contracts Agency, SEB Bank, Rural Support Service, TestDevLab, Tieto Latvia, Preiļi hospital, TV3 Group, Midis, Scandagra Latvia, Rezekne Special Economic Zone Administration, etc.

The research conducted during the studies confirm the demand for highly qualified specialists in the region of Latvia, the quality of trained specialists and their demand in the labor market.

3.1.4. Statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down into different study forms, types, and languages.

The study programme "Electronic Commerce Information Systems" has been implemented since 2012. The study process is organized only in full-time intramural mode in Latvian and English. Studies for EU citizens are basically funded by the state budget, but foreign students from non-European Union countries have a tuition fee. Information about students in the programme can be found in Annex 2.

The average number of students in the programme is 41 per academic year. In the reference period, 35 students studied in the 4-semester study programme, 50 students in the three-semester programme, which shows that 59% of the students not only obtained a professional or academic bachelor's degree or a professional higher education with a duration of studies of at least 4 years (160 CP), but also completed an internship in the amount of at least 20 CP or had work experience of at least 1 year. 53% of all students continued their master's studies after their previous higher education at RTA, the rest started their studies at RTA after their previous education at DU (6%) and one student each from the School of Business and Finance (BA), ISMa, Turība, VUAS, LULST, UL,

University of Twente (the Netherlands).

On average only 52% of students enrolled in the 1st year master studies acquire master's degree. The most important reasons for exmatriculation are academic failure and non-observance of obligations in the study process (39%), failure to resume studies after an academic leave (5%), which is often also affected by students' professional employment, and the end of the student exchange programme agreement, which applies to mobility students. In order to increase the number of students, RTS works on attracting foreign students.

In AY 2021-2022 and 2022-2023 there is a drop in the number of enrolled students and a higher dropout rate, accordingly, a decrease in the total number of students, which was affected by the crisis caused by Covid.

3.1.5. Substantiation of the development of the joint study programme and description and evaluation of the choice of partner universities, including information on the development and implementation of the joint study programme (if applicable).

Not applicable.

3.2. The Content of Studies and Implementation Thereof

3.2.1. Analysis of the content of the study programme. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators with the aims of the study course/ module and the aims and intended outcomes of the study programme. Assessment of the relevance of the content of the study courses/ modules and compliance with the needs of the relevant industry, labour market and with the trends in science on how and whether the content of the study courses/ modules is updated in line with the development trends of the relevant industry, labour market, and science.

The content of the study programme has been developed in accordance with the Cabinet Regulation No. 240 *Regulation on the State Standard for Academic Education* with the aim to create a competitive master's programme ensuring knowledge, skills and competencies corresponding to the level 7 of LQF, ensures the opportunity for mobility and encourages to continue studies at the doctoral level. Compliance of the study programme with the state education standard is described in Annex 3.

The goals, content, acquired knowledge, skills and competences of the study courses are consistent with the goals and achievable results of the study program. A mapping of the study program has been developed (see Annex 4), which reflects the knowledge, skills and competences specified in the study program and the corresponding study courses (in which the specific knowledge, skills and competences are acquired). The knowledge, skills and competences acquired in each specific study course make up a small part of the total results achievable in the study program. Using the

mapping of the study program, it is possible to track that all the determined knowledge, skills and competences are included in the study content.

Study course descriptions (see Annex 6) define the results of the study program aligned with higher education standards and the corresponding expected knowledge, skills and competences in specific study courses. The study course program specifies the prerequisites (passed courses) in order to successfully master the given study course. Therefore, study courses are completed in a certain order.

Content of the study programme

The compulsory part (31 CP) contains study courses that form the basis for learning electronic commerce information systems, including a master's thesis in the amount of 20 CP.

The limited choice part (6 CP) consists of 2 choice blocks:

• management science study courses;

• information technology study courses.

Taking into account the fact that the study program accepts applicants with a bachelor's degree in engineering or natural sciences, or in social sciences (economics, management science) or a professional bachelor's degree in the named branches of science in relevant fields or equivalent education, then in order to ensure the possibility of achieving successful study results for students with previous education in social sciences are offered as mandatory optional study courses in information technologies, while students with previous education in engineering or natural sciences are offered study courses in management sciences.

In the free choice part (3 CP) students can choose Environmental Protection (1 CP) and Civil Defence (1 CP) course if they have not been studied in the previous study phase. The 2CP study course "The Latvian language" is offered for foreign students, as stipulated by the Law on Higher Education Institutions.

In order to follow the demand of the labor market, scientific trends and respect the student's interests, the study program also provides other optional courses and these courses can change every year according to the demand, such as "Communication and social interaction", "Fundamentals of logistics and supply chain management", " ERP", "Leadership in the digital age".

The content of study courses/modules is updated according to the development trends of the industry, labor market and science:

Assessment of the relevance of the study course content, its relevance to the needs of the science and labor market is a mandatory study quality measure at RTA. The assessment is carried out in several stages coordinated within the study schedule:

1. **in the process of developing, coordinating and approving annual study plans**, the study course programmes are reviewed, the offer of literature sources is updated, and the coordination with the learning outcomes of the study programme is performed. In order to control the correlation of the outcomes of the study course and the study programme, each teaching staff defines the study outcomes of their study course according to the study programme approved by RTA and coordinating them with the outcomes of the study programme;
2. **in the process of developing annual self-evaluation reports of study directions and study programmes**, including the feedback obtained from surveys of students, employers and graduates;

3. discussing the content of the study programme, the outcomes of the study programme and study courses, and the requirements for the development of research papers in the **Study Direction Council** and in **the Study Direction lecturers' meetings**;
4. discussing the content of the study programme, the outcomes of the study programme and study courses in the **Study Direction Expert Council**;
5. in the process of defending master's theses.

The content of the study courses is updated according to the development trends of the industry, labor market and science. For this purpose, each lecturer regularly follows current affairs in his field; reads scientific literature; works in projects; conducts scientific research; participates in scientific conferences and seminars; visits exhibitions, production companies, Latvian and foreign universities; make appropriate adjustments to the content of their study course every year; regularly supplements the course program with the latest literature.

The didactic strategy of the master's programme envisages the unity of **international, regional, professional and research dimensions.**

The international context in the programme is provided through cooperation with higher education institutions abroad. This is done in order to provide students with the opportunity of mobility. **The regional and professional dimension** is provided by connecting the students' research competence with the needs of the labor market and by developing master's theses on the basis of particular companies, offering current innovations in the national economy. In the master's programme, special attention is paid to **relevance of research** to ensure that the award of the master's degree is based on the latest achievements and findings in the information technology sphere and in an interdisciplinary aspect.

Research theory and internship issues are included in the study course Methodology of scientific research work (2 CP), internship (20 CP) and development and defense of master's thesis (20 CP). Topical questions of research methodology are also included in study courses in order to be aware of the latest scientific breakthroughs in the specific field of electronic commerce information systems.

Content relevance
According to the forecast of "The Future of Jobs report of the World Economic Forum (2020)" until 2025, the greatest demand growth in the industry sector "Digital Communications and Information Technology" will be for the following professions (in order of priority): AI and Machine Learning Specialists , Data Analysts and Scientists, Big Data Specialists, Information Security Analysts; Process Automation Specialists, Digital Marketing and Strategy Specialists, Software and Applications Developers.
Students acquire knowledge and skills in areas such as data science, artificial intelligence, big data, digital marketing, in-depth cyber security and the Internet of Things within the study program, thereby increasing the competitiveness of the program as a whole.
As for the local labor market, the needs of employers were taken into account, identifying them through student internships, and participating in the work of such organizations as the "Rēzekne Entrepreneurs Association", the work of the regional department of the Latvian Chamber of Commerce and Industry, as well as cooperating with the Rēzekne SEZ administration. In addition, RTA organizes meetings and discussions with employers, updating information on required technologies and job title recommendations/requests.

3.2.2. In the case of master’s and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and

findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels (if applicable).

The awarding of the master's degree in information technology in the study programme is based on the achievements in the field of electrical engineering, electronics, information and communication technology science and knowledge in the sub-field of system analysis, modeling and design. The student in his master's thesis develops research in the field of information systems and electronic commerce.

According to RTA's methodological instructions for the development and defense of study research papers, a master's thesis is a study with a theoretical, methodological or applied orientation, as a result of which the author provides independently developed insights, conclusions, proposals for the solution of a problem and proves his ability to work in the relevant industry. RTA Rector's decree of December 2, 2012 no. 4-5/100 stipulates that in the development of the master's thesis there should be used at least 70 units of literature, including at least 35 units of scientific literature, 50% of which must be in a foreign language that is an official language of the European Union.

Mandatory requirement for master's students is the presentation of their research at a scientific or scientific-practical conference. For example, in 2021 at the RTA Faculty of Engineering student conference in the Information Technology Section, 21 papers were read, including 11 publications on electronic commerce information systems issues: for example, e-commerce conversion management and optimization principles, the importance of information systems in the development of social entrepreneurship, SEO and SEM advantages in digital marketing, research on the application of information systems in a healthcare industry, etc. It is important that in some of the students' publications, the students' co-author is his scientific supervisor, who provides support to the student in scientific research work.

The connection with the sub-sector of system analysis, modeling and design is also shown by the topics of master's theses, where theoretically based information system solutions are developed in various electronic commerce sectors such as real estate management, gardening, social entrepreneurship, medicine, public administration, education, etc. and there are offered innovative IT solutions in electronic commerce such as artificial intelligence, augmented reality, cryptocurrency electronic management solutions, etc. themes.

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is implemented in a foreign language or in the form of distance learning, describe in detail the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

Acquisition of the content of study courses takes place in lectures, workshops, laboratory works and students' independent work. 40 hours are provided for the acquisition of 1 credit point (1 CP = 1.5

ECTS) of the study course, including 12 (or 30%) contact hours (lectures, practical and laboratory works) in the lecture room / laboratory / computer room / workshop and 28 hours – for independent work at home / library / laboratories / computer rooms / workshops. The proportion between lectures and practical classes or hours devoted to laboratory work is determined by the lecturer of the particular study course. In most study courses this proportion is as follows: lectures – 50%, practical and laboratory works – 50% of the number of contact hours. Although there are also study courses in which a larger number of contact hours is devoted for practical work. Classes in these courses take place in the laboratories of the Faculty of Engineering and in the Laser Centre. The types of students' independent work are defined in the programme of the specific study course. The student receives assignments for independent work during the classes. All laboratories and workshops of the Faculty of Engineering are freely available to students 7 days a week for independent work. The workload of each lecturer includes the number of consultations corresponding to the volume of his/her workload; the time of a consultation is precisely specified in the list of lecturers' consultations. Unlike in large universities, RTA lecturers are available to students not only during the official consultation time; if the lecturer does not have a class, meeting or other urgent work, then a student can come to him/her without a prior appointment and immediately receive a consultation, defend the independent or laboratory work. In addition, the student is free to receive consultations from engineers and laboratory assistants working in laboratories.

Each study course description indicates the type of summative testing – examination or test – and the requirements to obtain credit points. The form of organization of the examination/test is determined by each lecturer, provided that the content of the examination/test corresponds to the content of the study course and can completely reveal at what level a student has achieved the learning outcomes planned in the study course. RTA has introduced the practice that during the semester a student can earn 40% of the total evaluation completing all independent works and practical works of the study course. This is an incentive for the student to study the content of the study course regularly throughout the semester, rather than mostly leaving it for the examination session. In some courses a student can earn up to 80% of the examination grade during the semester. For this purpose, a student must regularly (every week) complete the tasks of independent work assigned by the lecturer and defend them during the consultations to convince the lecturer that the student has completed the independent work him/herself and has acquired the topic; each such task is evaluated with a grade and influences the grade of the examination.

At the master's level, an individual student-cantered approach is essential for students, as almost all master's students have jobs, therefore laboratory and practical work can be done individually, too (upon agreement with the lecturer of the specific study course and the engineer and laboratory assistants of the Laser Technology Centre).

The principles of student-centred education in the study programme are ensured, first of all, by evaluating the students' previous preparedness and offering such study content that can ensure achievement of the learning outcomes of the study programme the best. Secondly, RTA offers flexible ways of studies, including taking into account employment of students during their studies, planning classes at a time convenient for students. Thirdly, students are provided with full consultative support and full access to the study resources (including the ones available remotely) necessary to achieve their learning outcomes. Fourthly, students' studies and research activities are focused on their personal growth, including development of their personality. Fifthly, students receive feedback on evaluation of the learning outcomes, which enables them to plan the course of studies and the best ways to achieve learning outcomes independently.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the study programme is implemented in a foreign language, provide information on how internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

Rezekne Academy of Technologies has established a long-term and successful cooperation with employers and employers' organizations in Rezekne and in Latgale region. There have been concluded cooperation agreements on the provision of internships for students in the master's study programme "Electronic Commerce Information Systems" with two largest employer organizations in Rezekne and Rezekne county - with the joint municipal institution "Rezekne Special Economic Zone Authority" and the association "Rezekne Entrepreneurs Association". 20 commercial companies operate in Rezekne special economic zone, including SIA "Leax Rēzekne" RSEZ, SIA "Midis" RSEZ, RSEZ SIA "Verems", RSEZ SIA "New Fules", "RSEZ SIA "Energy Resources CHP", but "Rezekne Entrepreneurs Association" unites 22 commercial companies and institutions which operate in financial sector. Long-term cooperation agreements have also been concluded between the educational institutions of Rezekne city municipalities, the institution "Rezekne Special Economic Zone Authority " and the association "Rezekne Entrepreneurs Association" on wider cooperation in the development of the study programme, including the provision of student internships. The number and terms of internships for the students of the programme in the abovementioned companies are coordinated separately each year, because the number of internships in certain terms depends on the availability of internship supervisors and the workload in the specific companies. Before starting the internship, a tripartite internship agreement is concluded between Rezekne Academy of Technologies, the company and the student, specifically defining the goals, tasks, deadlines, as well as the supervisor of the specific internship, and other questions.

Students mostly choose to have an internship at their workplace. The programme director is involved in the search for an internship provider if the student does not know any internship company. In certain cases, an internship is also provided at Rezekne Academy of Technologies. For the last 4 years, the students of the programme have completed internships in the companies as follows: branch of foreign merchant AKF, Decathlon Lithuania, UAB, branch of Latvia, VAS "Latvijas autoceļu uštūtējs", SIA "Vicars", joint municipal institution "Rezekne Special Economic Zone Authority", SIA" TestDevLab", LLU Malnavas College, SIA "LBRA", SIA "STRABAG", SIA "Preiļu slimnīca", SIA "DevCraft", SIA "Scandagra", SIA "Rapid Media", TERADA, etc.

There are no problems to offer an internship to foreign students studying in the study programme, as most cooperation partners operate in an international environment and internships can also be provided in English.

1. The ability to analyze and evaluate electronic commerce processes and information systems from an engineering, economic, environmental and social point of view, as well as explain and discuss complex or systemic aspects of the electronic commerce with both specialists and non-specialists.
2. The ability to demonstrate in-depth or expanded knowledge and understanding in the field of electronic commerce information systems, some of which correspond to the latest findings in

the relevant field and provide a basis for creative thinking or research, including working at the interface of different fields.
3. The ability to analyze, evaluate and use scientific and applied research, as well as independently formulate and critically analyze complex scientific and professional problems and make well-founded decisions.
4. The ability to conduct research in the field of electronic commerce information systems, analyze the results and prepare proposals for further improvement and development of electronic commerce information systems, as well as the ability to participate in and lead scientific research projects in the field of electronic commerce information systems.
5. The ability to conduct research in the field of electronic commerce information systems, analyze the results and prepare proposals for further improvement and development of electronic commerce information systems, as well as the ability to participate in and lead scientific research projects in the field of electronic commerce information systems.
6. The ability to develop and implement innovative, non-standard, technologically efficient and economically advantageous solutions.
7. The ability to independently advance the development of competences and specialization, take responsibility for work results and their analysis, conduct business in the electronic commerce and information technology sector, do work, research or continue studies, and if necessary, transform them using new approaches.

The internship tasks ensure the achievement of the outcomes of the study programme, because students:

1. get acquainted with the possibilities and problems of using the electronic commerce technology system (ECTS) in the relevant economic sector and region, the process and methods of solving them, and use of theoretical knowledge in solving practical tasks;
2. familiarize themselves with the internship company, organizational structure, operation, its goals, tasks, operating system, objects and methods related to other organizations, according to its field of work;
3. evaluate the performance indicators of the company in the context of the information system and electronic commerce products and services, which affect their practical application in the company, and comprehensively look at the common connections and interactions of all processes;
4. analyze the company's economic, technical and other indicators and compare them with advanced companies of a similar profile.
5. analyze the application of ECTS in the company, identify gaps and formulate the problem to be investigated/solved in the master's thesis.
6. participate practically in the company’s work, solving its current tasks together with the company's team in accordance with its operational plans.
7. formulate the topic, goal and task of the master's thesis.

Cooperation agreements with the abovementioned employer organizations on the provision of internships are attached in in the 2nd part.

3.2.5. Evaluation and description of the promotion opportunities and the promotion process provided to the students of the doctoral study programme (if applicable).

Not applicable.

3.2.6. Analysis and assessment of the topics of the final theses of the students, their relevance in the respective field, including the labour market, and the marks of the final theses.

Students develop a master's thesis in accordance with the Methodological Recommendations approved by the Council of the Study Field for development of a master's thesis. A master's thesis, within the meaning of the Methodological Recommendations, is a study performed by a student which confirms the acquisition of theoretical knowledge and skills, demonstrates the student's competence in the field of electronic commerce information systems, and is based on personally conducted theoretical and experimental research and its mathematical analysis.

The methodological recommendations state that the work must be a topical, concrete, scientifically based and independent research on the use of electronic commerce information systems for solving business or management problems. The work must include the author's independently developed, new and justified proposals and conclusions for solving the researched problem arising from the research results. The work must contain novelty and it must have a section with an analysis of the economic assessment of the problem. Mandatory requirement: every MA student must prepare and publish or submit for publication a scientific article on the topic of the master's thesis before the defense of the thesis.

Two supervisors are appointed for the master's thesis - according to the topic of the chosen master's thesis in the direction of engineering and in the direction of economics/management sciences. At least one of the supervisors of the master's thesis must be a member of the academic staff of Rezekne Academy of Technologies and have a Phd degree in the field/interdisciplinary field/study direction to which the specific master's thesis is applied.

In the period from 2017, 44 master theses were developed and defended in the study programme. Master's theses defense committee (Dr. sc. comp. Agris Šostaks, committee chairman (FC UL assistant professor, IMCS UL researcher), vice-chairman: Sandra Ežmale (assistant professor Dr. oec., RTA), Commission members: Imants Zarembo (Printful Latvia, AS project manager), Lienīte Litavniece (associate professor, Dr. oec. RTA), Pēteris Grabusts (professor, Dr. sc. ing., RTA).

The topics of the Master's theses touch on such topical issues of electronic commerce information systems as, for example, GPS data processing for more efficient use of resources in road maintenance sphere, the importance of manual and automated testing in the development of an online store, monitoring the stability and security of the e-commerce IS network, decision-making for the management and optimization of e-commerce tool conversion, the possibilities of using information and communication systems in the management of loyalty programs, advertising auction technology and its application in electronic commerce, the integration of bitcoin cryptocurrency into the electronic payment system of Latvian merchants, as well as the analysis of the information systems (G2G, G2C, G2B) used by the state administration and proposals for their improvement.

RTA has a uniform requirement for master students to participate in at least one scientific conference to enable them to independently formulate and critically analyse complex scientific and professional problems, justify decisions, and, if necessary, perform additional analysis, design and defend a master's thesis. To ensure that the master project contributes to creation of new knowledge, development of research or professional activity methods, as well as certifies that the master student is able to demonstrate advanced or broader knowledge and understanding, part of

which corresponds to the latest findings in the industry of mechanics and metalworking, RTA has in place the Rector's order 4-5/100 dated 2 December 2012 providing for the requirement to obligatory use in design of master projects the latest scientific journals in the field and scientific articles from internationally recognised databases in English. Such a requirement allows master students to explore the latest studies in the field and evaluate the innovation of their research ideas.

Before the defence of a master's thesis, there are master's theses research discussion seminars organised in the study field with the participation of all master's students and supervisors of their theses, and if the theme is related to the needs of a specific company, then its representatives also attend it, and pre-defence of master's theses during which the teaching staff and students in the study field discuss the methodology and literature chosen for the master's theses and the innovative capacity of the research. During their studies, master's students also present their research at events organized by RTA for entrepreneurs, within the framework of projects thus developing the ability to speak publicly on research topics, participate in discussions, and defend their scientific opinion. Before defending the master's thesis, it is checked in the Unified Latvian Plagiarism Checker. The Council of the Study Field deals with analysis of each case of coincidence, as well as evaluates the level of innovation of master's thesis research. On the basis of this research, several patent applications have been filed in accordance with the Intellectual Property Management Policy of RTA.

Presentation of master projects at RTA takes place as an open session where the state examination committee and everyone present can ask the candidate for the master's degree questions; whereas the candidate demonstrates their ability to use arguments to explain and discuss complex or systemic issues in the corresponding field of management with specialists and non-specialists.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (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 the learning outcomes to be achieved by providing the respective examples.

The study programme Electronic Commerce Information Systems has absolutely all resources and provision of the study field, which are described in detail in criteria 2.3.1-2.3.3. The available infrastructure, laboratory/workshop base and information provision allow to implement the study programme successfully, to achieve all the learning outcomes provided for in it. On average, 50% of the study courses are practical classes with the maximum use of the available software, laboratory/workshop equipment and facilities.

3.3.2. Assessment of the study provision and scientific base support, including the resources provided within the framework of cooperation with other science institutes and higher education institutions (applicable to doctoral study programmes) (if applicable).

Not applicable.

3.3.3. Indicate data on the available funding for the corresponding study programme, its funding sources and their use for the development of the study programme. Provide information on the costs per one student within this study programme, indicating the items included in the cost calculation and the percentage distribution of funding between the specified items. The minimum number of students in the study programme in order to ensure the profitability of the study programme (indicating separately the information on each language, type and form of the study programme implementation).

Information on the financing of the study programme Electronic Commerce of Information Systems (including by years in the reporting period) and its sources is viewed in detail in the criterion 2.3.1.

RTA calculations suggest that the direct costs of the academic master's study programme Electronic Commerce of Information Systems (remuneration of academic and general staff) are EUR 2750.81/ 75% per one reference student a year, the indirect costs (expenses for ensuring RTA activities, including library, immovable property tax, rent of premises, operating expenses of buildings and equipment, telephone subscription and service costs, utilities, current repairs, special programmes, etc.) are EUR 916.94/ 25% per one reference student a year. Predicting the number of students in the group of 7 and more to ensure the profitability of the study programme. In general, the tuition costs for one full-time student in Latvian are estimated at EUR 3667.75 per year, which does not exceed the costs in European states for the training of one student in a similar speciality.

The annual study costs for one non-EU student are estimated at EUR 2,400.00; direct costs amount to EUR 1,800.00 per one reference student a year, indirect costs amount to EUR 600.00 per one reference student a year.

Funding of the study programme Electronic Commerce of Information Systems						
Financial year	2017	2018	2019	2020	2021	2022
Minimum Ratio of Study Costs:	1.5	1.5	1.5	1.5	1.5	1.5
Ratio of Study Level:	1.5	1.5	1.5	1.5	1.5	1.5
Basic Costs of Studies (euro)	1393.22	1458.51	1518.98	1525.64	1630.11	1630.11
Amount of scholarship (euro)	150.82	150.82	150.82	150.82	150.82	150.82
Sports, culture, student hostel (euro	13.52	13.52	13.52	13.52	13.52	13.52

The number of state-budget funded study places	9	9	15	21	24	24
The number of state-budget funded study places	29692	31014	53731	75538	93150	94398

3.4. Teaching Staff

3.4.1. Assessment of the compliance of the qualification of the teaching staff members (academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants) involved in the implementation of the study programme with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments. Provide information on how the qualification of the teaching staff members contributes to the achievement of the learning outcomes.

16 lecturers are involved in the implementation of the study programme "Electronic Commerce Information Systems". 13 (81%) lecturers are RTA elected in an academic and/or scientific position, 3 (19%) are not elected. There are 9 (56%) lecturers with a Phd degree and 8 out of them are RTA elected.

Positions of elected lecturers of the study programme "Electronic Commerce Information Systems":

Positions of elected lecturers of the study programme "Electronic Commerce Information Systems":

- Professors- 3 (including RTA elected leading researchers - 3);
- Assoc. professors - 4 (including RTA elected leading researchers - 3, researcher - 1);
- Assistant professors - 3 (including RTA elected leading researchers - 3);
- Lecturers- 2 (including RTA elected researchers- 2);

Positions of visiting lecturers of the study programme "Electronic Commerce Information Systems":

- Visiting assistant professor - 1 (including RTA elected leading researcher- 1);
- Visiting lecturers - 2.

For full information about the lecturers of the study programme, see their publications in Annex 14 of Part 2 and CV of lecturers in Annex 10. See Annex 11 for the certificate of SD lecturers' knowledge of the national language and Annex 12 for the certificate of the knowledge of the English language.

Teaching practitioners with extensive professional work experience in the industry are involved in the implementation of the study programme (see criterion 2.3.6 of part 2). The qualifications of the teaching staff fully meet the requirements of regulatory acts and ensure the achievement of the expected outcomes of the study programme.

The study programme employs competent teaching staff in the relevant sector and field of study - 7

lecturers of the courses of information technology block have master's degree (3) and, respectively, 4 have Phd degree in engineering. 7 lecturers of the courses of the block of management sciences have a master's degree (3) and a Phd degree in social sciences (5).

In academic programmes, the scientific research competence is ensured by the active scientific activity of the teaching staff. All teaching staff have publications during the reporting period.

The professional experience of teaching staff employed in the study programme in branch-companies is very essential: for example, Imants Zarembo has been working in ICT companies since 2005 and is currently a project manager at AS "Printful", Artis Teilāns has been working at AS "Exigen Services Latvia" for more than 20 years, Mihails Kijaško has been an information systems security manager and ICT system administrator for almost 20 years at RTA, Edgars Pavlovskis works as a programming engineer in an educational institution, Iluta Arbidāne has been working as an accountant in commercial companies since 1995, Sandra Ežmale has been managing Rezekne Special Economic Zone Authority for more than 15 years, but Eva Šiļina has been working for 7 years in the field of labor protection, fire protection, civil defence in companies, and implements projects and develops materials in these areas.

Full information about the lecturers of the study programme can be found in the appendices of section 2, their publications can be found in appendices 13, 14 and the lecturers' CV in Annex 10. See Annex 11 for the certificate of SD lecturers' knowledge of the national language and Annex 12 for the certificate of knowledge of English. The qualification of the teaching staff fully meets the requirements of the regulatory acts and ensures the achievement of the outcomes of the study programme, as well as meets the requirements specified in the third paragraph of the first part of Article 55 of the Law on Higher Education Institutions (annex 8 of part III).

3.4.2. Analysis and assessment of the changes to the composition of the teaching staff over the reporting period and their impact on the study quality.

The total number of teaching staff in the programme has not changed during the reporting period.

In terms of competence, lecturers are intensively engaged in the implementation of research projects:

Year	Project	Lecturers
2016-2018	Developing The Competence Center for Mechanical Engineering (1.2.1.1/16/A/003)	A.Teilāns
2018-2019	Laser processing optimization tool (KC-PI-2017/97)	A.Teilāns
2020-2022	LZP-2019/1-0094 Application of deep machine learning and data mining for the study of plant-pathogen interactions: apple and pear scab pathosystems	A.Teilāns, I.Zarembo, P.Grabusts, S.Kodors,

2020	VPP-COVID-2020/1-0009 ARTSS: Perspective technologies for sustainable and secure services	A.Teilāns, I.Zarembo, P.Grabusts, S.Kodors
2021	E-mentor as a transformation tool for ensuring zero-waste food consumption in educational institutions	S.Kodors,
2022-2024	Development of autonomous unmanned aerial vehicles based decision-making system for smart fruit growing (No. lzp-2021/1-0134)	I.Zarembo, S.Kodors,

Lecturers M.Kijaško, S.Ežmale, I.Kotāne, I.Mietule, I.Arbidāne, P.Grabusts, S.Kodors and A.Teilāns were involved in competence enhancement activities within the project "Strengthening the academic staff of Rezekne Academy of Technologies in the study directions "Mechanics and metalworking, thermal energy, thermal engineering and mechanical engineering" and "Management, administration and real estate management", no. 8.2.2.0/18/A/016". Competence enhancement included improving the English language and leadership skills.

Staff changes: until AY 2022-23 there were several staff changes. The study course of professor, Dr.ing. Irēna Silineviča is conducted by assistant professor, Dr. oec. Sandra Ežmale, the study course conducted by professor O. Užga–Rebrovs is now taught by professor Dr. Artis Teilāns, while Dr.habil.geol., prof. Noviks' study course is delivered by assistant professor, Dr.biol., Rasma Tretjakova.

Significant personnel changes took place in AY 2022-2023, because lecturers Dr.sc.ing Imants Zarembo and Dr.sc.ing. Sergey Kodor were invited to implement the study courses. The decision was made to attract a new generation of lecturers to the programme, thus improving the quality of studies.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals or peer-reviewed monographs may be additionally specified. Information on the teaching staff included in the database of experts of the Latvian Council of Science in the relevant field of science (total number, name of the lecturer, field of science in which the teaching staff has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

Not applicable.

3.4.4. Information on the participation of the academic staff, involved in the implementation of the doctoral study programme, in scientific projects as project managers or prime contractors/ subproject managers/ leading researchers by specifying the name of the relevant project, as well as the source and the amount of the funding.

Provide information on the reporting period (if applicable).

Not applicable.

3.4.5. Assessment of the cooperation between the teaching staff members by specifying the mechanisms used to promote the cooperation and ensure the interrelation between the study programme and study courses/ modules. Specify also the proportion of the number of the students and the teaching staff within the study programme (at the moment of the submission of the Self-Assessment Report).

Lecturers cooperate with each other during the study process. The following mechanisms are used to promote cooperation:

- most of the study courses are conducted by 2-4 lecturers instead of 1 lecturer; the advantages of such approach are described in criterion 3.4.2; the lecturers of the specific study course mutually agree on the topics that each of them will deliver; lecturers organise the course of examinations/tests and evaluate students' knowledge jointly;
- the development of the master's thesis is led by two lecturers - in accordance with the topic of the chosen master's thesis in the direction of engineering sciences and in the direction of economic/management sciences.
- work (office) places of lecturers are located in one room or adjacent rooms; they exchange information concerning the study process, scientific research and project development on a regular basis;
- the principle of mutual helpfulness; lecturers, engineers, laboratory assistants always cooperate in accordance with their qualifications;
- regular seminars of lecturers and students of the last semester on the course of development of the master's theses:
- joint work in scientific projects and commissioned research;
- work on joint publications and participation in conferences.

The ratio of students to teaching staff in the programme is obtained in accordance with the methodology provided by OECD dividing the number of full-time equivalent (FTE) students in the programme (3.9) by the number of FTE teaching staff (0.6) employed in the programme. In 2022, at the time of submitting the self-assessment, the ratio of teaching staff to students is 7, which is lower than the EU average indicator (14). Taking into account that the didactic strategy of the programme provides for an individual approach to students, a lower ratio of students and teaching staff promotes implementation of a student-oriented study process and a more individual approach to the needs of students, which is especially relevant at the level of master's studies. The comparative analysis shows that the ratio of students to teaching staff at the level of bachelor's and master's studies is close or lower for example, in Luxembourg (5) and Norway (8).[1]

[1] EDUCATION AT A GLANCE 2021 © OECD 2022. Available: https://ej.uz/h1x9

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Annex 1.7z	1.pielikums.7z
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 2.docx	2.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 3.docx	3.pielikums.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 4.xlsx	4.pielikums.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 5.docx	5.pielikums.docx
Descriptions of the study courses/ modules	Annex 6.7z	6.pielikums.7z
Description of the organisation of the internship of the students (if applicable)	Annex 7.docx	7.pielikums.docx
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Annex 8.edoc	8.pielikums.edoc