APPLICATION

Study field "Manufacture and Processing" for assessment

Study field	*Manufacture and Processing*
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Self-evaluation report

Study field "Manufacture and Processing"

Riga Technical University

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I - Information on the Higher Education Institution/College

1.1. Basic information on the higher education institution/ college and its strategic development directions, including the following information:

Riga Technical University was founded in 1862 as Riga Polytechnic, later Riga Polytechnic Institute, and is the oldest technical university in the Baltic States. Following the restoration of the Republic of Latvia in March 1990, Riga Polytechnic Institute was renamed Riga Technical University (RTU). Over years RTU has become the leading centre of higher engineering education and science in Latvia, obtained a positive assessment of international experts and has been accredited by the Supreme Education Council of the Republic of Latvia.

RTU values include sustainable development, quality, openness and cooperation, creativity, academic freedom, motivation to explore and discover.

At the beginning of academic year 2020/2021, an academic and scientific staff of 1,024 people work at nine faculties of RTU (Faculty of Architecture; Faculty of Civil Engineering; Faculty of Computer Science and Information Technology; Faculty of E-Learning Technologies and Humanities; Faculty of Electronics and Telecommunications; Faculty of Electrical and Environmental Engineering; Faculty of Engineering Economics and Management; Faculty of Mechanical Engineering, Transport and Aeronautics; Faculty of Materials Science and Applied Chemistry) and four RTU Study and Science Centres in Cēsis, Liepaja, Ventspils and Daugavpils carrying out high-quality academic activities and scientific research at a contemporary level. RTU is the second largest university in the Republic of Latvia in terms of student number and has educated and trained more than 160,000 graduates in total.

RTU carries out active study and research work, acquiring new partners worldwide, working together on project implementation, student exchange and the development of joint study programmes. Active development of a student campus is underway in Ķīpsala, where new faculty buildings are being built, while those built during earlier years are getting a new look, modern content and design.

Many research and scientific projects are being carried out in cooperation with RTU partners, which result in both new patents and successful business activities. RTU successfully develops cooperation to strengthen its role in the development of higher engineering education in the world and in the development of Latvia.

RTU has defined its mission – we are building a competitive, educated, innovative and creative future, the vision – an internationally competitive, dynamic and modern university of science and technology.

Accredited RTU study directions and a number of study programmes in May 2021:

Study direction	Number of study programmes
Architecture and Construction	20
Economics	3

Study direction	Number of study programmes
Energy, Electrical Engineering and Electrical Technologies	14
Physics, Materials Science, Mathematics and Statistics	7
Internal Security and Civil Defence	6
Information Technology, Computer Engineering, Electronics, Telecommunications, Computer Control and Computer Science	37
Chemistry, Chemical Technology and Biotechnology	9
Mechanics and Metalworking, Thermal Energy, Thermal Engineering and Mechanical Engineering	27
Manufacturing and Processing	6*
Translation	2
Management, Administration, Real Estate Management	21
Environment Protection	6
Total:	**158**

* Two study programs are not subject to re-accreditation.

The offer of RTU study programmes is in compliance with the forecasts with regard to the needs of the labour market in both Europe and Latvia in the coming decade. The RTU study programme offer ensures education and training of the specialists in information and communication technologies (ICT), engineering, management and humanities, for which a significant shortage in the labour market is predicted.

In recent years, the number of foreign students studying to obtain a degree or qualification in Latvia has increased. In addition, international student mobility growth is projected to continue also in the future. In the academic year 2019/2020, there were by 25% more foreign students studying at RTU in comparison with the academic year 2018/2019. Taking into account the above mentioned, RTU has great opportunities to further increase the number of foreign students. It also provides an appropriate offer of RTU study programmes in English – 16 Bachelor study programmes, 27 Master study programmes, and 13 Doctoral study programmes, moreover, this list is updated from year to year.

In November 2020, 14,006 students studied at RTU – 10,307 studied at undergraduate study programmes, 3,184 studied at graduate Master degree programmes and 515 – at the Doctoral study programmes.

The guiding principle of RTU Strategy for 2021–2025 is the proactive link between the activity of the university and the needs of the national economy, focus on high quality and effectiveness. The basis for the activity of RTU is the study process built on science, innovation and in cooperation with the industry, which ensures preparation of specialists required by the Latvian national economy, thus serving as a foundation for sustainable growth of Latvia. The RTU's strategy for the new programming period is a consecutive continuation is the previous strategy of the university for 2014-2020. It has been developed in compliance with the objectives and priorities defined in Latvian development planning documents.

According to the National Development Plan for 2021-2027 of Latvia, fundamental changes are planned in the near future in four directions – Equal Rights, Quality of Life, Knowledge Society, and Responsible Latvia, in the achievement of which a high-quality study process, excellent research, as well as sustainable innovation and commercialization activities play an important role, which are important elements in RTU's vision to become an internationally competitive, dynamic and modern university of science and technology.

Keynote of the RTU Strategy: High quality and effectiveness – proactive link between the activity of RTU and the needs of the national economy. RTU is one of the leading science and technology universities of the Baltic and Nordic region, which is acting based on a study systems built on research, innovation and cooperation with the industry. RTU prepares European and global-level engineers – leaders: developers of new technologies.

In order to implement RTU's vision to become an internationally competitive, dynamic and modern university of science and technology, RTU's strategy defines four main objectives for the next programming period, three of which are related to the implementation of basic university functions: excellent science, quality studies and sustainable valorisation. The fourth, institutional excellence, is related to the university support function and the development of internal governance in the six areas: digitalisation, sustainable development, effective financial and administrative action, internationalisation, communication and cooperation, human resources development. For all the objectives identified in the strategy define specific tasks to be performed and result indicators to make it possible to follow the implementation of the strategy so that RTU can realise its vision.

The implementation of the RTU Strategy is approved by a decision of the RTU Senate. Following the approval of the Strategy, RTU Rector once a year ensures definition of the annual RTU aims and tasks with clear performance indicators set at the level of each RTU unit. RTU Strategy is implemented, and the results achieved are analysed annually with regard to the defined tasks.

RTU Strategy is published at https://www.rtu.lv/en/university/strategy.

1.2. Description of the management 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.

The structure and administration of RTU are established in compliance with the University vision, mission and objectives and taking into account the specifics of the University management. The administrative structure is based on a decentralized decision-making process and obligations arising from the Law on the Higher Education Institutions, the Constitution of RTU, resolutions of RTU Senate, the orders issued by the Rector, as well as other RTU documents. The functions of

various organizational units have been approved in their regulations approved by the Senate. Overall, RTU management can be divided into three levels: university level, administration level and faculty level.

At the University level, there is the Constitutional Assembly (200 representatives – 120 academic personnel representatives (60% of the total number), 40 student representatives (20% of the total number) and 40 general staff representatives (20% of the total number). The Assembly includes all members of the RTU Senate. The conditions for the formation of the Assembly are defined in Article 30 of the RTU Constitution – see the file of Annex 01 of the list of Internal regulations), the Senate (50 Senators – 38 academic personnel representatives (75% of the total number), 10 student representatives (20% of the total number) and two general personnel representatives (5% of the total number). The conditions for the election of the representatives of the Senate are defined in the attached Article 7 of the Regulation of the Senate of RTU - see the file of Annex 02 of the list of Internal regulations), Scientific Council (composed of Deputy Deans in for research, Vice-Rector for Research, Deputy Vice-Rector for Research; the Rector, Vice-Rector for Academic Affairs, Vice-Rector for Strategic Development, Vice-Rector for Finance and the Chair of the Senate also have the rights of membership of the Council). At the level of administration, the operational management of the university is exercised by the Rector, whereas the Board of the Rector plays an advisory role in the adoption of such decisions, with the participation of the Rector, Chair of the Senate, Vice-Rectors, Administrative Director, Deputy Rector for International Academic Cooperation and Studies, Director of the Legal Department, Director of Infrastructure Development Department, President of the Student Parliament; the Deans Council comprising the Rector, Deans, directors of studies and research centres, Director of Riga Business School, Chair of the Senate, Vice-Rectors, Deputy Rector for International Academic Cooperation and Studies, Director of Infrastructure Development Department, President of the Student Parliament; operational management meetings uniting the Rector, Administrative Director, Deputy Vice-Rector for Research in Scientific Work, the heads of administrative departments (department directors, unit managers). At the faculty level, the highest decision-making bodies are faculty councils whose composition depends on the size of the faculty.

External partners and stakeholders are involved in the University management through the RTU Advisory Board (27 members). It provides an opportunity to receive independent opinion on important issues and possible solutions from various perspectives. Each faculty also has its own Advisory Board, which provides its own vision for improving the supply of study programmes in line with sectoral needs and market trends.

Each faculty also has its own student self-government, while RTU Student Parliament coordinates faculty student self-governments. Students are represented in all RTU decision-making bodies and can therefore participate in the University strategic decision-making.

The Rector, Vice-Rector for Research, Vice-Rector for Academic Affairs, Vice-Rector for Finance and Vice-Rector for Strategic Development are the senior officials of RTU. The Rector implements the general administrative management of RTU and represents RTU without a specific mandate. The Rector is elected by the Constitutional Assembly for a period of five years for no more than two consecutive terms for the same person. The Rector is elected, approved in office and removed from office pursuant to the regulatory enactments governing higher education institutions.

The operational management of RTU is exercised independently, in accordance with the delegation of the Rector, by the Vice-Rector for Research, Vice-Rector for Academic Affairs, Vice-Rector for Strategic Development and Vice-Rector for Finance. The Senate elects the Vice-Rector for Research, Vice- Rector for Academic Affairs, Vice-Rector for Strategic Development and Vice-Rector for

Finance based on the recommendation of the Rector for the term of office of the Rector. The Rector may also delegate certain functions to other RTU officials and, on the basis of the Rector's proposal; other Vice-Rector positions may be created by a Senate decision.

The Vice-Rector for Research supervises and is responsible for Doctoral study programmes and research work, including support to young researchers, research infrastructure, research funding, applied research, intellectual property protection, RTU scientific publications and scientific conferences. The Vice-Rector for Academic Affairs supervises and is responsible for the study process at the Bachelor, Master, first and second-level professional study programmes, further education, including training programs, security and quality assurance in studies, credit points, determination of academic staff positions and workload, as well as the selection and admission of students. The Vice-Rector for Strategic Development is responsible for the development strategy and its successful implementation, supervises the implementation of projects important for the development of RTU, and represents the interests of RTU in interaction with public authorities, partners and the public. The Vice-Rector for Finance is responsible for the financial management processes of RTU and for allocating and planning financial resources to ensure the functioning of RTU and implementation of the development strategy.

The accounting, study administration, science administration and human resources administration at the university are centralized. Other administrative processes, such as procurement and project management, are centralized to the extent necessary to avoid institutional risks. At the same time, a decentralized management system has been provided at a high level at RTU, with a certain degree of autonomy for each academic unit. This means they have their own budget and self-governing structure, which allows defining and meeting the objectives of the organizational unit. This approach motivates the heads of departments to be proactive, to plan the development of the unit, and to apply for funding.

RTU governance structure information is published at https://www.rtu.lv/en/university/structure-and-administration.

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, as well as the stakeholders involved in the development and improvement of the quality assurance system and their role in these processes.

The RTU has established an internal quality management system that respects the standards of Part 1 of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG).

RTU internal quality management system works in line with the “Excellence approach” (approved on 30 January 2017 at the meeting of the RTU Senate, Minutes No 606), as well as the “RTU Quality Policy” (approved by the Senate on 25 September 2017, Minutes No 612).

The Quality Policy is focused on the implementation of the RTU mission and the achievement of the strategic objectives. The Quality Policy lays out the framework and pathways for development and improvements of the RTU Strategy, research, study process and organization. The University Quality Policy is aligned with the European Association for Quality Assurance in Higher Education (ENQA) standards and guidelines. The RTU Excellence Approach and quality policy are mutually integrated documents which require RTU to use the quality model of the European Foundation for

Quality Management (EFQM).

The EFQM quality model assumes cooperation with student representatives, partners, professional associations, student organizations, other higher education institutions, businesses and organizations. RTU maintains an open dialogue to explore the needs of the parties involved and to respond appropriately by developing feedback to day-to-day and long-term cooperation.

By establishing links with the parties involved, the administration of RTU contributes to the development of excellence and ensures the clarity, unity, building of the work environment and diversity management of the objectives to be achieved.

RTU staff participates in quality assurance by providing suggestions and feedback to improve the RTU quality system. The heads of the RTU departments are responsible for carrying out internal quality assurance procedures and processes in their departments.

Based on the results of regular student and graduate surveys, improvements in the quality of the study process are being planned.

Cooperation with partners, suppliers and other stakeholders takes place in accordance with the RTU Strategy, establishing appropriate cooperation networks and identifying appropriate policies, activities and processes for effective cooperation aimed at ensuring the quality of the RTU and acquisition of feedback. To ensure the topicality and continuous development of existing study programmes and before the introduction of new study programmes the interests of all stakeholders in modern and interdisciplinary technology education are considered.

External stakeholders (public authorities, cooperation partners, representatives of the public) assess the study process and its results in State Examinations, practical placements (internships) and accreditation, and contribute to improving the content and quality of study programmes.

More on this point is set out in Section 2.1.

RTU Excellence Approach is published at https://www.rtu.lv/en/university/strategy/rtu-excellence-approach.

RTU Quality Policy in Latvian is published at https://www.rtu.lv/lv/universitate/dokumenti/kvalitates-politika (English translation is in the file of Appendix 03 of the list of Internal regulations).

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 21 of the Law on Institutions of Higher Education 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 evidence for the full compliance, partial compliance or non-compliance.

1.	The higher education institution/ college has established a policy and procedures for assuring the quality of higher education.	Complies In line with the quality model introduced by RTU, process analysis and improvement are ongoing. Performance indicators and the results of the assessment of various surveys are analysed. The quality report data are compiled after the end of the academic year. Annual agreements on the target study process performance indicators are signed with the faculties; the quality is assessed by analysing the achievement of the defined objectives relative to the plan. For more details, see the 5th row of this table.
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.	Complies The development of study programmes takes place in accordance with the “Procedure for the application, elaboration and amendment of the study programmes” (approved at the Meeting of RTU Senate on 26 April 2021, Minutes No 649). The departments and institutes implementing the study process, Faculty Councils, the Office of Vice-Rector for Academic Affairs, the Student Parliament and the Senate are involved in ensuring the internal study quality of RTU. These institutions carry out comprehensive assessment of the new study directions and study programmes, the changes to the study directions and programs and the annual reports of the improvement of the study directions. At RTU, the operation of the internal quality assurance mechanism takes place at the level of the Rectorate, faculties, study directions and study programmes. At the level of the Rectorate, the internal study quality control of RTU is carried out by the Office of Vice-Rector for Academic Affairs. The Study Department performs: (1) the maintenance and control of the Study Programme Register, which involves control of the conformity of the study curriculum to the aims, tasks and learning outcomes of the study programme, as well as the control of changes; (2) maintenance and control of the Study Course Register, which involves control of the conformity of study course descriptions with the learning outcomes, as well as quality control of study course descriptions; (3) periodical student polling at the University level.

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.	Complies The evaluation of learning outcomes takes place in accordance with the "Regulation on the Assessment of Learning Outcomes" (approved at the Meeting of RTU Senate on 29 May 2017, Minutes No 610) and "Regulations on Final Examinations at RTU" (approved at the Meeting of RTU Senate on 26 April 2021, Minutes No 649).
4.	Internal procedures and mechanisms for assuring the qualifications of the academic staff and the work quality have been developed.	Complies In order to ensure the qualification and performance quality of academic staff, professional advancement needs are regularly assessed when evaluating the results. Professional advancement training modules are developed by collecting information from: (1) academic staff surveys on professional advancement needs once in two years; (2) analysis of student polling results; (3) cooperation with student self-governments; (4) world trends and good practices of other Latvian universities in the field of professional advancement of academic staff; (5) information provided by academic staff on professional advancement topics of interest; (6) proposals from the heads of academic units for professional advancement of academic staff. The Centre for Academic Excellence (CAE), a teaching and learning centre, was set up at the end of 2018; its aim is to develop a strategy for the professional advancement of academic staff, including in line with Article 16 of Cabinet Regulations No 569. Other tasks of CAE are detailed in Section 3.5. Academic units organize regular or one-time professional advancement activities having assessed the need for professional training of academic staff. The units assess whether it is more appropriate to participate in a particular event for certain representatives of academic staff, all members of the unit or to invite also members from other units.

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.	Complies Student expectations and satisfaction with the curriculum and study process are identified in sequential and planned surveys at all stages of study. Student surveys are organized in accordance with the Regulations on “Student Polling for Assessment of the Study Process” (approved at the Meeting of RTU Senate on 27 January 2014, Minutes No 577). The aim of polling is to clarify the adaptation of first-year students to the university system and the satisfaction of all students with the study process, lectures, and practical classes after each semester, the satisfaction of students with the services offered by the University, and the overall satisfaction of graduates with the study programme. The results of the surveys are available to academic staff, heads of organizational units and students in a summarized form. Annually, the State Revenue Service provides information on the employment of RTU graduates. The Total Quality Management System of RTU analyses performance results of the study process, comparing the characteristics of the study programmes, including the resulting performance indicators related to the study process in the overall EFQM quality model of RTU. At the beginning of September of each year, a faculty Activity Plan on study process indicators are drawn up: (1) number of students; (2) number of graduates; (3) number of graduates who complete their studies on time; (4) number of students expelled from University; (5) number of foreign students; (6) average age of elected academic staff; (7) number of study programmes implemented in English; (8) average indicator of the evaluation of faculty academic staff; (9) number of persons with a scientific degree elected to academic positions (%); (10) number of foreign guest lecturers. The established Faculty Study Activity Plans for the following year is drawn up by Faculty Deans, together with Deputy Deans for Academic Affairs and institute directors; they are approved by the Rector of RTU. RTU administration meets with representatives of faculties to evaluate the faculty activity plans on study process indicators, evaluating the progress in the previous academic year and defining the indicators to be achieved in the next two academic years. These indicators are used to monitor the study process performance of the faculty. These indicators and other aspects influence the amount of performance-based funding allocated to the faculty and contribute to the achievement of the objectives set forward in the RTU Strategy. The study process funds are administered in accordance with methodologies approved by the Senate or as stipulated by the Vice-Rector for Finance. Principles of the methodologies motivate the heads of departments to be proactive, to plan the development of the unit, and to apply for funding. These methodologies are described in more detail in section 3.1. of the self-assessment report.

6.	The higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study direction whilst implementing their quality assurance systems.	Complies At the level of the faculty and study direction, internal quality is ensured by the Faculty Council, the Study Direction Committee and Directors of the study direction, Directors of the study programmes, administration of the institutes and chairs implementing study programmes. Within the framework of the study programme, internal quality is ensured by the program director and by the academic staff implementing the program. Internal quality control at the level of the study programme is carried out by the administration of the relevant institute or chair. In order to ensure continuous development of the study programmes, RTU Study Direction Committees monitor academic activities in the relevant study direction and are responsible for the curriculum and quality of the study programmes within the study direction, including the accreditation of the study direction. Inclusion of employer representatives in the Study Direction Committee is a mandatory requirement. Study Direction Committee acts in accordance with the “Regulation of the Study Direction Committee” (approved by the Resolution of RTU Senate Meeting on 03 December 2012, Minutes No 594). The basic tasks of the Study Direction Committee are: (1) to analyse the situation in the labour market and make suggestions for the development of new study programmes as well as for the closure of the outdated study programmes; (2) to carry out expert assessment of the curriculum and quality of the study programmes, assess their compliance with the defined objectives and compliance with the research area represented and labour market requirements; (3) to organize and monitor the accreditation of the study direction and the licensing of study programmes; (4) to analyse the assessment and recommendations made by external experts and organize elimination of identified shortcomings; (5) to carry out an analysis of the study direction self-assessment report as well as the annual reports on study direction development activities; (6) in order to achieve strategic objectives of the University, to assess the proposed changes to study programmes with a view to increasing the quality of all study programmes included in the study directions; (7) to analyse the results of student, graduate and employee surveys and organize elimination of identified shortcomings, as well as organize additional surveys.

II - Description of the Study Direction (1. Management of the Study Direction)

1.1. Economic and/or social grounds for the creation of the study direction and the relevant study programmes, the assessment of the interrelation among the study programmes, as well as the analysis of the significance (singularity) of the study programmes in comparison with other similar study programmes in Latvia and abroad.

The study field “Manufacture and Processing” is implemented in two departments of the Institute of Design Technologies (IDT) of the Faculty of Materials Science and Applied Chemistry (FMSAC) of RTU, namely, the Department of Design and Materials Technologies and the Department of Clothing and Textile Technologies.

Study programmes on three levels of the Qualification Framework of Latvia (LQF) are implemented within the study field: Bachelor, Master and PhD level.

In the professional study programmes of the study field, the industry competencies are acquired by both future manufacturing engineers of the textile and clothing industry (LQL 6), professionals of textile, clothing and wood products and interior design and technologies - product designers (LQL 6). By supplementing and developing their capacities in the professional Master studies (LQL 7), they become the future managers of companies of the above industries and their departments, establish their own companies, and by continuing studies on the PhD level (LQL 8) they receive the PhD degree in materials science.

Along with the development of new technologies and materials, both industries welcome new professionals who are able to perform professional, artistic, innovative and research activities of an extensive range covering the development of the initial idea of clothing, textile and wood products, technical design, production, the approbation of new technologies and materials. They are also expected to define and to analytically describe information, issues and solutions in their science branch or profession, to be able to explain, provide arguments in discussion and to demonstrate a scientific approach in solving problems, to assume responsibility and initiative by working individually, within a team or managing the work of others.

In compliance with the mid-term forecast of the labour market, until 2027 developed and updated by the Ministry of Economics of Latvia and the long-term labour market forecast until 2040, the number of jobs in the higher qualification professions could increase by approximately 80 thousand jobs and account for more than a half (52% or 461 thousand) of the total number of jobs in the national economy [Information report “On mid-term and long-term forecast of the labour market].

For comparison, in the report of the Ministry of Economics of 2017, it was concluded that only 71% of employees in the highest qualification professions possessed higher education [Labour Market Report].

In compliance with the labour market forecast of the Ministry of Economics until the year 2020 and 2030, the demand for employees with the medium and high qualification will increase. The biggest increase in the demand is predicted for professionals and senior professionals related to science and engineering science.

As regards the employment of graduates of the study programmes of the study field, quite a broad range of professions has been identified, it is related to the development of new products in several branches of the national economy: In wood processing, which is the biggest branch of the

processing industry, the sector of design and creative industries of the art industry, the industry of producing textile products, clothing, leather and leather products, within the subgroup of the main group of the high qualification professions “Senior professionals”: “Managers of the production and specialised services field” and “Senior professionals of the science and engineering sciences field”, as well as in the area of professional pedagogy. The above listed industries and sectors are traditional in Latvia and the circulation of employees is continuous there.

The ability to creatively develop and to continuously improve products, services and processes, the inter-disciplinary education along with general competencies help graduates to adapt fast to changes in the relevant fields of the national economy corresponding to the labour market, as well as to establish and manage own undertakings within the framework of the process of restructuring of the Latvian economy.

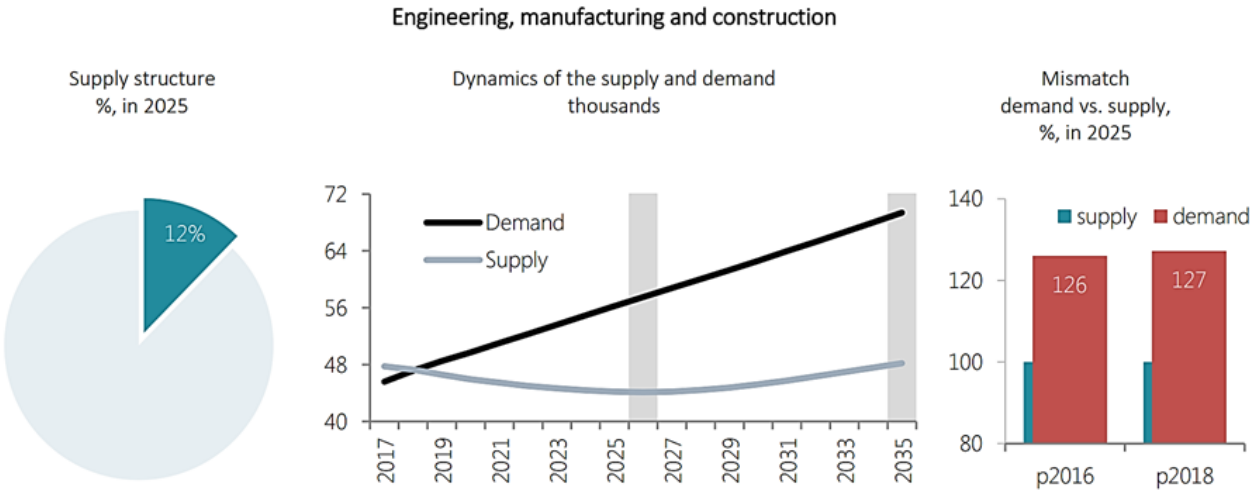


Figure 1.1.Informative Report on Medium and Long-term Labour Market Forecasts

The most important professional knowledge, skills and competencies expected by the employers of the textile industry, wood industry and design industry from the professionals having completed the professional higher education are as follows: the ability to follow and analyse global trends in the industry, identification of new markets, the attraction of new customers and development and introduction of new products, development of proposals for the development of the companies, modelling, construction and modification of design. Besides the abilities of the Bachelor level, the demand for the competence of the Master level is increasing, and these open up opportunities for the new professionals to establish new companies in the above referred industries and manage them in a sustainable and socially responsible manner. Product designers are successfully employed in interior design, development of the website and in other modern and highly demanded specialisations, many of them establish their own companies.

The interest of businesses regarding RTU students and graduates is very high now because the generation change of leading professionals takes place in manufacturing plants. Soviet time professionals retire and there is an urgent need to replace them with new people. Several times a year managers of undertakings contact IDT and request to recommend employees with engineering background or students-interns: clothing patternmakers, quality engineers, production technology professionals, etc. Entrepreneurs also visit the students’ fashion show and the meetings of defence of the Bachelor thesis in order to get acquainted with the abilities of potential employees and to encourage them to start employment at their manufacturing plants.

The demand for clothing patternmakers and technology professionals trained by IDT has been constantly stable in the Latvian companies for the last three years. Despite the substantiated predicted decrease of jobs in the European textile industry as a whole (a decrease of 13% from

2013 to 2025), the stability of employment and the increase of the demand of up to 8% can be seen in Latvia. This was also the forecast according to the analytical review of EU Skills Panorama (2014) prepared by ICF GHK and Cedefop for the European Commission.

A majority of the Master students are employed, most of them in jobs related to the speciality. Also among the Bachelor students of the last year there are students employed in the speciality. As the internship managers of the undertakings confirm, undertakings are interested in cooperation with our students because the knowledge of students and their understanding of the process of development of products (construction, technology, design) conform with the requirements of undertakings with growth opportunities.

Four study programs are currently actively implemented within the study field "Manufacture and Processing" (Table 1.1). These are as follows:

- Two professional Bachelor study programs "**Clothing and Textile Technology"** and **"Material Technologies and Design";**
- One professional Master's study program: **"Design engineering"** - developed based on the study programs "Clothing and Textile Technology" and "Material Design and Technology", where admitting of new students was discontinued from the academic year 2020/2021. Individual students graduate from their studies.
- One Ph.D. study program "Clothing and Textile Technology". In compliance with the resolution of the RTU Senate adopted in the meeting on 26 April 2021 (Minutes No. 649.), the title of the study program is changed to **"Fibre Materials Science".**

Table 1.1

Study programs of the study field "Manufacture and Processing"

Doctoral studies (8.LQF)	Fibre Materials Science (until 2021 Clothing and Textile Technology)	
Professional Master studies (7.LQF)	Design Engineering (since 2020/21 academic year)	
	Clothing and Textile Technology - admission is no longer from the 2020/21 academic year	*Material Design and Technology -admission is no longer from the 2020/21 academic year*
Professional Bachelor studies (6.LQF)	Clothing and Textile Technology	Material Technology and Design

Besides the academic staff of IDT, highly qualified academic staff from institutes and departments of six other RTU faculties are involved in the implementation of the content of the study program.

FMSAC Polymer Materials Institute Department of Polymer Materials Technology; **Faculty of Architecture** (AF) Department of Architecture and City Construction, Department of Fine Arts, Department of Architecture and Design; **Faculty of Computer Science and Information Technology** (FCSIT) Institute of Applied Mathematics Department of Engineering Mathematics; Faculty of E-Learning Technologies and Humanities (FELTH) Institute of Applied Linguistics, Institute of Humanities Department of Sociology and Pedagogy, Department of Engineering Pedagogy and Psychology, Centre of Research of the History of Engineering Sciences (CRHES); **Faculty of Engineering Economics and Management (FEEM)** Institute of Business Engineering and

Management; Department of Innovation and Business Management, Institute of Labour Protection and Civil Defence; **Faculty of Machine Sciences, Transportation and Aeronautics** Institute of Mechanics and Machine Building (IMMB), Department of Theoretical Mechanics and Materials Resistance (Department of Mechanical Technology of Fibre Materials).

Both professional Bachelor programs of the study field "Manufacture and Processing" jointly train **all the leading professionals needed for the textile industry - designers, patternmakers and technologists in the area of textile and clothing product development and manufacturing, which is a unique situation in Latvia**, as no other higher education institution provides training of professionals of the textile and clothing manufacturing industry of LQL 7. Improvement of the programs of the study field is performed in compliance with the A new Circular Economy Action Plan For a cleaner and more competitive Europe (Brussels, 11.03.2020).

The goals of the professional Bachelor study program "Clothing and Textile Technology" are to train highly qualified engineers of LQL 6 for the textile and clothing manufacturing industry - professionals in textile technologies, clothing technologies and clothing design, familiar with the basic modern technologies and specialised design methods of the industry, by proving engineering technical training and the materials science basics in the sub-branch of textile and clothing technologies, as well as creating the basis for further studies for gaining higher level knowledge and competence. **In the professional Bachelor studies of Clothing and Textile Technology**, engineers specialise in **Textile manufacturing technology** or **Clothing construction**, or **Clothing manufacturing technology**. The study program implemented by IDT is the only one in this country where engineering personnel of the Bachelor level is trained for textile and clothing manufacturing undertakings.

There are similar study programs in Lithuania: the Bachelor study program "Fashion Engineering" at Kaunas University of Technologies (KTU) (Fashion Engineering) and Estonia: the Bachelor study program "Fashion Engineering 2020" at Tallinn University of Applied Sciences (UAS) (Fashion Engineering 2020), however, these study programs do not provide the in-depth education in the textile technology on the Bachelor level. Master level students have this opportunity in Kaunas. The study program of the Estonian higher education institution provides specialisation in the management of raw materials. Study programs of higher education institutions of other European countries were also reviewed, and it should be concluded that their content and study courses do not differ considerably from the study program RWCV0 "Clothing and Textile Technology".

The goals of the professional Bachelor study program "Material Technology and Design" are to provide competitive professional second level higher education and training of students for practical work in the field of design and technologies by specialising in development and design of new materials, multifunctional, clothing, wood and textile consumer products of a high aesthetic and ergonomic value and their collections, as well as development and design of interior concepts, to develop the skills of scientific research work and to encourage their application; to provide comprehensive knowledge to students by providing extensive inter-disciplinary education, to develop the professional's skills and competences in compliance with the requirements of the profession "product designer" and the labour market, to enable the graduate to work successfully as a member of a design group, manager, manager of an company or independent designer, as well as to prepare for further studies for obtaining the Master degree; to develop creative potential, to promote the students' interest in science, technologies and the processes in the society, to encourage the students' development into a positive, modern, responsible and capable to act personality who can work independently and to adopt independent decisions.

The study program "Material Technology and Design" was accredited in 2006 and 2013. Although the study program has been implemented for over 20 years, it has not lost its topicality and

importance, as it is continuously developed and improved. The study program for obtaining the professional Bachelor degree in the materials technology and design and the professional qualification “Product designer” is a multi-disciplinary “umbrella” type study program with the following specialisations: Clothing design and technology; Wood products and interior design and technology; Textile design and technology.

The study program “Material Technology and Design” is the only one in the university targeted at the development of wood and textile consumer and environment products and services and development of technologies for their implementation. The study courses, projects and internships included in the program provide diverse education and skills, by mastering which the graduates can successfully work as designers in design organisations, in the education and public sector, as heads of design groups, advisers in the trade undertakings of the relevant industry, also the structures of the state and local governments, as well as establish their own manufacturing/ service undertakings and work as self-employed designers.

In comparison to design-oriented Bachelor study programs offered by the EU universities, the study program “Material Technology and Design” includes several specialisations, as well as the scope of the studies is broader, as the studies cover the complete cycle of manufacturing of the product, including preparation of the service, starting from the product idea, the demand and market research up to its manufacturing, selection of the advertising and sale strategy. Moreover, the acquired base education allows easy adaptation in the fields of even remotely related activities and/ or further education, the performance of research work.

In compliance with Cabinet Regulations No. 27 (9 January 2018) for Specific Objective 8.2.1 “To Reduce Fragmentation of Study Programmes and to Strengthen Sharing of Resources” of the Operational Programme “Growth and Employment”, IDT has got involved in the consolidation plan of the RTU study programs. Within the framework of the plan, the new modern professional Master study program “Design Engineering” has been developed in 2019 and licensed in 2020, developed based on two professional Master study programs “Clothing and Textile Technology” (Latvian education classification code: 47542), and “Materials Design and Technology” (Latvian education classification code: 47548), by diversifying and considerably improving both the theoretical and practical study courses in compliance with the requirements of the development of industries.

The goal of the professional Master study program “Design Engineering” is to provide and develop the professional, creative and research competencies of students:

- in the field of textile and clothing design and manufacturing, by training professionals who provide development, implementation and management of the order of an undertaking, their completion process and management of employees, efficient new technologies, methodologies and systems, as well as improvement of the professional ethics and socially responsible working and expansion of awareness thereof, or
- in the field of design, by training professionals for working in the area of development of indoor and outdoor products according to the ergonomic and technological solution of their design applicability, by using appropriate raw materials (wood, metal, textile, etc.), knowing their processing technologies and implementation systems and skills of their use.

In the academic year 2020/2021, the new professional Master's study program “Design Engineering” has started training professionals who will graduate as Master's degree holders in design engineering in two specialisations: Clothing and textile manufacturing technologies or Design. Along with the implementation of the study program in Latvian, it is also planned to implement the study program in English. There is no other similar study program in the country now. Similar Master's study programs are implemented by a few European higher education institutions: *Eindhoven University of Technology (TU/e), Industrial Design Leeds University, School*

of Design, Design MA, in UK Tallinn University of Technology, Technology of Wood, Plastics and Textiles).

Within the scope of the study field, the Ph.D study program has neem improved and updated during the last two years, where the students who have completed their Bachelor and Master level studies continue developing the acquired competencies as researchers in the fibre materials science by covering the research of textile fibre materials and clothing, as well as the research of wood fibre materials and other materials containing lignine and their products.

The **goal of the Ph.D study program "Fibre Materials Science"** ("Clothing and Textile Technology" until 2021) is the promotion of the development of the sub-fields of the materials science: textile and clothing, wood materials and products, their technologies and related fields of the national economy in the region by training top qualification professionals of international level for independent scientific work in research, design and development of innovative and traditional fibre materials and their products and introduction of relevant technologies, as well as academic work in higher education institutions for regular renovation of the teaching staff, thus ensuring the generation cycle in the materials science field as a whole.

The Ph.D study program which is close from the content point of view , but with a narrower scope of themes, is implemented in the Latvian University of Agriculture, Wood Materials and Technologies by covering wood fibre materials and their technologies. Similar study programs in the Baltics, in Tallinn University of Technology Chemical and materials technology and Kaunas University of Technologies Materials Engineering, are focused on the direction of fibre materials and polymer materials chemistry technologies or have a narrow scope in the direction of the design of the structure of textile materials. Ph.D. study program Fibre Science is implemented at Cornell University Fibre Science Ph.D.). The goal of the research direction developed within the study program is an investigation of fibre materials and their use in clothing and engineering constructions (for example, composite materials), biomedicine materials and house furniture.

Unlike in the Baltic States, in Central European and Western European universities, doctoral studies in the field of fibrous materials and products (clothing) are carried out in a wider variety of research objects, due to a large number of lecturers and students. Similar study programs: In Ljubljana University (Slovenia) the study program Textile Engineering, Graphic Communication and Textile Design, In Zagreb University (Croatia) the study program Textile Science and Technology, in Boros University (Sweden) the study program Textile Material Technology.

1.2. Aims of the study direction and their compliance with the scope of activities of the higher education institution/ college, the strategic development directions, as well as the needs and the development trends of the society and the national economy.

The goal of the study field "Manufacture and Processing" is to provide competitive, scientific research based, multi-level education to students,

- by providing high quality implementation of the study programs included in the study field, continuous development and continuity of studies;
- by following the development of the represented industries of the national economy in the country and the region, engaging in inclusive cooperation with industry undertakings;
- by integrating research and the recent scientific achievements in the industrial areas in the content of the study programs.

The goals of the study programs comprised by the study field are subordinated to the goal of the study program, by forming a unified system and reflecting the specifics of every study program at the same time.

The following objections of the study field should be listed:

- training of highly qualified professionals of manufacturing of textile and clothing, wood products and product designers, as well as managers of undertakings of the relevant industries who know the modern technologies and specialised design methods, needed for the national development, by encouraging the development of students into responsible and creative personalities;
- training of new materials researchers for the development of the sub-branches of the Textile and Clothing Technology and Wood Materials and Technology and renovation of the academic staff in the country;
- creating motivation of students for further education and life-long learning.

The goal of the study field "Manufacture and Processing" arises from the RTU strategic goals.

what is *excellent science* - promotion of the international competitiveness of scientific activities and improvement of the quality. *High quality studies* - focus on the attraction of students who are well prepared for studies, differentiated offer of education, more flexible approach to the choice of study courses and development of new perspective directions, namely, life-long learning and digitalisation. *Sustainable valorisation* - proactive, clear and involving cooperation with the industry. *Institutional excellence* - sustainable and modern governance. Effective, clear finance system based on strategic goals. Well-arranged study and science environment. Thus, the goals of the study field conform with the uniform development strategy of the university and correspond to the common trends of development of the society and the national economy.

1.3. SWOT analysis of the study direction 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 direction 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 direction for the next assessment period shall be provided.

For the provision of the quality of the study direction, the annual report of improvement of the study field is prepared and assessed by an expert assigned by the Study Vice-Rector. The report is approved by the RTU Senate. SWOT analysis is an indispensable part of the report on improvement and it allows demonstrating achievement and identifying problems in a concise manner. This is an important tool for achieving the goals of the direction. The SWOT analysis of the study field is presented below.

Strengths

- Democratic relations between the administration, academic staff and students.
- Developed infrastructure, modern, equipped classrooms and the uniform communication and

study portal ORTUS, accessibility of the infrastructure 24 hours a day.
- Highly qualified academic staff;
- Developed and equipped specialised laboratories.
- Cooperation with foreign higher education institutions and the possibilities to study at foreign higher education institutions within the mobility.
- Cooperation with foreign scientific institutes.
- Possibilities of implementation of the study programs in English by involving foreign students.
- The possibility to participate in international and national exhibitions, competitions, fashion shows and scientific conferences.
- Students' interest in specialisations, the demand and competitiveness on a broad labour market.
- Good prestige, graduates work in jobs conforming to their profession.
- The possibilities for students to continue studies on the next level.
- Good cooperation with the industry compsnies, professional organisations.

Weaknesses

- Slow renovation of the technological equipment of laboratories and the provision of specialised CAD/CAM software.
- An inefficient policy of scholarships.
- Insufficient amount of individual scholarships to enable students to use the opportunities of mobility programs to the full extent.
- Students are forced to work in parallel to studying.
- Decrease of students' motivation.
- No possibilities to provide appropriate remuneration to the academic staff.
- Insufficient financial possibilities to employ additional staff to maintain and expand specialisations.
- Insufficient funding for attracting more foreign academic staff.

Opportunities

- Increasing the number of students based on the better demographic situation among the youth born after 2000.
- Expansion of foreign cooperation by establishing contacts with both universities and undertakings.
- Involvement of professionals of leading employers in the study process, in particular, in the provision of project and internship venues and evaluation of results.
- Diversification of study methods and supplementing of methodological materials.
- Implementing changes in the study program in compliance with the achievements of science and technology and changes in the legislation of the Republic of Latvia.
- More extensive use of students' exchange programs.
- Involvement of successful designers and entrepreneurs in guest lectures and seminars.
- Organisation of post-graduate courses for manufacturing professionals.
- More extensive involvement of Ph.D. students not only in research but also in the study process as the result of the implementation of the new model of Ph.D. studies in Latvia.

Threats

- The unstable, volatile situation in the education system.
- Unstable financial situation.
- Insufficient state funding for higher education institutions.
- High load of the leading academic staff.
- Reduction of the number of eventual applicants due to changes in the demographic situation

in Latvia, as well as in the result of the consequences caused by the pandemic.
- The outflow of youth abroad.
- Rapid changes of legislation.
- The lack of interest of Ph.D. students in academic work and outflow to the private sector.
- Insufficient funding for the long term may cause deterioration of the quality of the study process.
- Restructuring of manufacturing undertakings of the relevant industries caused by the pandemic.

The goals of the study field “Manufacturing and Processing” are coordinated with the IDT strategy, which follows the unified RTU strategy. Given the importance of the sector to the national economy and the diversity of production, as well as the rapid growth and development of textiles, wood, and other materials and technologies, study programmes in the field of materials science must be continuously improved. The development plan of the study field is closely related to the development of new types of materials, their processing technologies, and fashion and design trends in Latvia, the European Union, and the world.

The opportunities of the study field are and will be used for popularization the study field and its programmes within the unified structure of RTU and its Strategy both through RTU International Cooperation and Foreign Students Department, RTU Continuing Education Department and IDT separately, maintaining close contacts with employers, industry associations and professional educational institutions.

Despite the fact that currently there are few foreign students in the programmes of the study field “Manufacturing and Processing”, they are subsidized from the revenues of other RTU programmes, which have a significant number of foreign students.

Also, in accordance with the RTU regulations, with the support of the Department for Studies, the content of study programs included in the field and various teaching methods are updated, methodological materials are supplemented, using RTU's centralized approach to IT online tools and their seminars and courses. The opportunities provided by the project SAM 8.2.2 are and will be used, attracting new teaching staff and at the same time scientists.

The described will allow strengthening the weaknesses of the study field, avoiding the risks supported by the Risk Management Policy developed by RTU.

RTU assesses risks in the following areas - basic functions (science, study, and valorisation processes) and support or institutional excellence functions (digitization, sustainable development, efficient financial and administrative activities, internationalization, communication and cooperation, human resources development). Risk identification and management at RTU take place in accordance with the RTU Risk Management Policy and the risk categories specified therein: • strategic risks; • operational risks; • financial risks; • legal / compliance risks; • risks of fraud and corruption; •project risks. RTU Vice-Rector for Development is responsible for risk management at RTU, but the risk management process is coordinated and supervised by the RTU Risk Management Working Group (established by the order of the RTU Rector) in accordance with the risk management methodology approved by the university.

The main strategic goal of IDT, where the study programs of the study field are implemented, is to train internationally recognised, highly qualified and competitive young professionals, to promote the development of research in the current and new science direction, to particularly promote practical solutions of problems important for the branches of the textile and clothing, wood materials processing and design fields in cooperation with entrepreneurs, based on the cooperation of the public, private and academic circles. The main objectives of IDT are to develop and improve

the study process, to provide the academic staff suitable for the study process, to develop and improve the scientific activity of IDT and to work actively on implementation of the valorisation and commercialisation processes.

The goals of the study field “Manufacture and Processing” are coordinated with the strategy of IDT. Considering the importance of the industry in the national economy and the diversity of manufacturing processes, as well as the rapid development of materials and technologies, the study programs of this sector need to be improved continuously. The development plan of the study field is closely related to the development of new types of materials, their processing technologies and fashion and design in Latvia, the European Union and globally.

Development plan of the study field “Manufacture and Processing” (Annex 3):

- Continuous improvement of the study methodology of the study programs of the study field and study courses.
- Creation of encouraging study environment by offering modern study materials to students and developing e-study materials.
- Development of the academic capacity by involving young scientists, Ph.D. students, guest academic staff and industry professionals in the study work.
- Provision of the opportunities for improvement of the qualification and pedagogic competence of the academic personnel in Latvia and abroad on annual basis.
- Development of the scientific research capacity by encouraging scientific activity, improving the potential of the research personnel, strengthening the Ph.D. studies and broadly involving students in scientific and research work.
- Continuation of work in national and international research projects, as well as working on project applications.
- Promotion of international cooperation by inviting students and the academic staff to use the possibilities offered by the ERASMUS+ mobility program more actively.
- Provision of more active cooperation with foreign higher education institutions.
- Provision of international accessibility and recognition of the study programs by developing an implementation of study programs in English and attracting foreign students.
- Continuation of involvement of professionals of related industries in provision of the study process in the role of guest lecturers and in the commissions of final examinations, thus linking the theory with the industry topicalities and demonstrating the practical application and importance of the acquired knowledge;
- Continuation of developing cooperation with vocational secondary education institutions to attract students.
- Improvement of the material technical provision of the units involved in the study process to provide the quality of education conforming to the requirements of the modern labour market.
- Following up on the improvement of the resources of the RTU Scientific Library and ordering the recent literature within the scope of granted resources every year.

Development perspectives of the study field should be linked with continued provision of implementation of high quality, prestigious, internationally recognised study programs, which teach to perceive information with criticism and to process it in a creative manner, to think analytically, to develop innovation abilities and to continue life-long self-education, by training professionals able to compete on the international labour market. The study process of the study field is integrated with scientific research in the field of the relevant industry. Development perspectives of the study field follow from the high importance of the industry of the national economy of this direction in the

development of the Latvian economy. A product with an added value in design packaging is increasingly demanded in the area of both manufacturing and services. Therefore it is planned to include in the direction specialisations the studies promoting a broad range of professional, artistic, innovative and research activities, which cover both clothing manufacturing, manufacturing of textile and wood products, the fields of smart textiles because innovative design based on the understanding of culture and environment values and relations will contribute to dynamic development and recognition of the Latvian economy, as well as the securitability and welfare of its residents.

1.4. The structure of the management of the study direction and the relevant study programmes, and the analysis and assessment of the efficiency thereof, including the assessment of the role of the director of the study direction 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 direction.

Governance of the study field and relevant study programs is provided by the FMSAC Council, the commission of the study field and the director of the study direction, the directors of the study programs, the administration of the departments implementing the study programs and also the self-governments of the students of FMSAC.

Internal quality control at the faculty and at the level of the study direction is ensured by the Vice Dean for Academic Affairs. The quality of the study programme is ensured by the Head of the study programme and the academic staff involved in the implementation of the program, whereas the whole process is controlled by the administration of the responsible institute or department. Once in an academic year the abstracts and curriculum of the study programme, the methodological materials, as well as recent study literature and methodological guidelines for study papers (reports, study papers, internship reports and graduation papers) are reviewed. The academic staff and the administration of the study programme participate in various experience exchange activities, cooperating with the higher education establishments in other countries, participating in the meetings with representatives of relevant institutions and entrepreneurs, as well as discuss the current developments in the field, analysing the results of the students' research papers and projects.

The responsibilities and duties of the Head of the study programme are provided in the job description. The most important of them include management of study programme development, improvement of the curriculum in compliance with the requirements of the scientific fields or the sectors of the national economy, implementation of quality assurance, supervision of study plan development, promotion of internationalization, cooperation with RTU Study Department providing the input of data in the Information system, as well as the cooperation with other departments of RTU that are involved in the implementation of the study programme. The administration of the Faculty constantly monitors the compliance of the premises and technical equipment with the modern quality requirements, and appropriate classrooms have been created with the necessary multimedia equipment. Support functions for the development and implementation of study programmes are provided by RTU Study Department. RTU Programs Management and Curriculum Design Unit plays an important role supporting the improvement of the study programme.

RTU has established a rigid system for the management and development of study programmes.

Proposals to introduce any changes in the curriculum are made by the Study Direction Committee based on the recommendations of the academic staff, references from employers, suggestions from student self-government, as well as observing the latest trends in the national economy and the labour market. The Study Direction Committee requests the Faculty Council to review and approve them. Based on the decision of the Faculty Council, the RTU Senate approves changes in the study direction. Amendments in the structure of study programmes are approved by the order of RTU Vice-Rector for Academic Affairs.

Management of the study field “Manufacture and Processing” is provided by the commission of the study field comprising professionals of the textile and clothing industry, professionals of the wood processing, design and art field, managers of undertakings. Both the academic environment and the professional environment of relevant industries are represented. The commission consists of the directors of all the four study programs; the director of FMSAC IDT, the manager of IK “Dizains videi”, a member of the Latvian Designers’ Society; a board member of the Latvian Association of Woodprocessing Entrepreneurs and Exporters, the head of the Product Development Department of “Fristads Kansas Production”; a board member of SIA “Solutions”; the head of the FMSAC Department of Design and Materials Technologies; the associated professor of the FMSAC Department of Design and Materials Technologies; the FMSAC Deputy Dean of study and scientific work; a representative of the FMSAC self-government of students as an observer.

Technical support of the study field is provided by the study programme record-keeping as well as IT service. Such cooperation in the implementation of the study programmes within the study direction is to be evaluated as efficient and stimulating the development of the study direction.

The management structure of the study field is given in Attachment 4.

1.5. 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 the study period, professional experience, and the options for the students to have their previously acquired formal and non-formal education recognised within the study direction by providing specific examples of the application of these procedures.

The admission process and procedure of students’ matriculation is stipulated in the RTU Admission Regulations, which are elaborated based on the Law on Higher Education Institutions and Regulations of the Cabinet of Ministers No 846 issued 10 Oct 2006 ''Regulations on Requirements, Criteria and Procedures for Enrolment in Study Programmes'', as well as the specific requirements of study programmes and the industry. The RTU Admission Regulations are approved by the RTU Senate and published on November 1 each year (see the files of Appendix 29-34 of the list of Internal regulations).

Admission requirements are logical, understandable, and linked to the goals defined in the RTU Strategy. Admission system is state-of-the-art, easily accessible, logically structured, and is evolving in line with today's digitalization trends, providing the potential students with the convenient and easy to use application to university registration tool.

Applicants are admitted to full-time and part-time undergraduate programmes based on the results of the Centralized Examinations (CE) in Mathematics, the Latvian language and the Foreign Language, and the final grades in individual subjects obtained in the Secondary Education, and the

entry test results. If, in addition to these CEs, the applicant has a CE in Physics or Chemistry, the results of these CEs are taken into account in the ranking calculation.

In order to participate in the competition for the state budget funded seats, the rating in Mathematics CE is calculated as the average value of all Mathematics CE rating sections and must be at least 12 percent. An applicant with a CE in mathematics of less than 12 percent may apply only for a tuition fee.

To determine the candidate's rank in the competition, each CE rating, calculated as an average of all CE evaluation sections, and each entry test (if any applies) is multiplied by the appropriate weighting factor and the resulting multiplications are added together. Some study programme applicants must pass an entry test, the result of which shall be multiplied by an appropriate weighting factor and summed up in the total calculation of rank.

Persons, who have received secondary education prior to 2009 (including), as well as persons, who have received secondary education abroad, or persons, who were exempted from passing the secondary education state examinations in accordance with the procedure set by regulatory enactments, may be admitted to the study programmes based on their year grades in the secondary education document in the subjects mentioned in the RTU Admission Regulations, which must be successfully passed. Up to 2019, the admission based on the secondary education year grades was attributed to persons who completed secondary education prior to 2004. In general, the RTU Admission Regulations follow Regulations of the Cabinet of Ministers No 846.

Persons who have completed secondary education and have not passed any of the CEs mentioned in the RTU Admission Regulations or have failed the year grade, shall pass the CE in accordance with the Cabinet of Ministers Regulations No 335 "Rules on the content and procedure for centralized examinations".

Persons who have not passed CE in Latvian and who do not meet the requirements of RTU Admission Regulations, shall pass the entrance examination in Latvian as prescribed by RTU. The result is evaluated in percentage.

In compliance with Cabinet Regulations No 543 adopted on 29 September 2015 “Regulations on Replacement of the Foreign Language Centralized Examination in the General Secondary Education Program by Foreign Language Examinations Conducted by International Testing Institutions”, CE in the foreign language can be replaced with a foreign language examination conducted by an international testing institution the certificate of which must be presented to the RTU Admission Committee.

The applicants who have acquired a bachelor’s degree in a field relevant to the study programme are enrolled to the graduate study programmes. The applicants take part in the competition with a weighted average grade from the Bachelor or professional study programme records. The weighted average grade is calculated as the sum of all the grades received in each study course multiplied by the credit points acquired in the study programme and is divided by the total number of credit points within the study programme. If credit points are not verified, the number is calculated as the multiplication of the grades and contact hours obtained in each study course divided by the total number of contact hours.

Before applying for the doctoral studies, the candidate and the Head of the Doctoral Study Programme must agree upon the possible scientific advisor / consultant and receive his/her written consent. The Doctoral Thesis scientific advisor may be from another scientific establishment; however, the applicant must also choose the scientific advisor / consultant from RTU. Every year, the RTU Senate approves the regulations for the admission of doctoral students for the study year, which set deadlines for the submission of admission documents. The applicants for Doctoral study

programmes, can submit application for full-time studies by arriving at the Doctoral Studies Department, bringing the required documents, within the admission deadlines. Documents necessary for the competition are compiled by RTU Doctoral Studies Department. After the collection of documents, the Doctoral Studies Department submits them to the Scientific Committee of the respective Faculty, which draws the Ranking table of the applicants according to the evaluation criteria set by the Faculty Scientific Committee and approved by the order of RTU Vice Rector for Research. The Ranking table is submitted to Admission Committee of doctoral students. The Admission Committee is approved by an order of RTU Vice Rector for Research.

Taking into account the spread of Covid-19 and in order to facilitate the admission process of applicants for studies at RTU, starting from the summer of 2020, the admission process was improved.

There are two ways to apply for the state budget funded seats in undergraduate study programmes:

- Electronically in the Joint Enrolment Undergraduate Study Programme information system, using the e-service portal (https://www.latvija.lv). Given the spread of Covid-19, with the summer 2020 admission, secondary school graduates of the 2019/2020 school year can approve the electronic application remotely without arriving in person. If the secondary education was obtained abroad or until 2019/2020 school year, the applicants must confirm their electronic applications by arriving at the designated locations within the deadlines and presenting the originals of the required documents;
- Arriving at the RTU Admission Committee in person, presenting the originals of the required documents.

To apply for the state budget funded seats in the graduate study programmes RTU undergraduate study programme graduates can submit their applications online on RTU portal ORTUS. Taking into account the spread of Covid-19, with the summer 2020 admission, also graduates of other Latvian state-accredited higher education institutions' undergraduate study programmes can submit applications electronically on the RTU website, or by visiting RTU Admission Committee.

Applicants who do not qualify for the state budget funded seats and applicants who have received their education outside Latvia, as well as in other specific cases, must appear in person at the RTU Admission Committee within the admission deadline, with the required documents.

Taking into account the spread of Covid-19 and in order to improve the RTU admission process and make it easier for applicants to apply for studies at RTU, it is planned to introduce electronic application also for tuition fee studies with the summer of 2021.

Recognition of previously acquired formal and non-formal education at RTU is carried out in accordance with the “Regulation on the Recognition of the “Courses Completed at Other Universities and RTU Study Programmes” (Resolution of RTU Vice-Rector for Academic Affairs No 02000-1.1/29 as of 4 April 2016) and the “Procedure for Recognition of Competencies Developed Outside Formal Education or From Professional Experience and Learning Outcomes Achieved in Previous Education at Riga Technical University” (approved at the Meeting of RTU Senate on 23 September 2019, Minutes No 632).

RTU Admission Regulations are published at https://www.rtu.lv/lv/studijas/uznemsana/uznemsanas-noteikumi for local students and at http://fsd.rtu.lv/ for foreign and exchange students.

As regards the professional Bachelor studies, there are special admission requirements in the study program “Material Technology and Design” where applicants have to take an admission exam in

the drawing. The grades of centralised exams and the evaluation of the admission exam in drawing serve as the basis for ranking students for the study places with the state funding. Along with the studies with the state budget funding, there are also study places with their own funding. Students are admitted to studies and pass the admission exam in July-August prior to the beginning of the academic year.

Applicants holding the professional Bachelor degree in materials technology and design and the qualification of the product designer or the professional Bachelor degree in clothing and textile technology and the qualification of the engineer in clothing and textile manufacturing, or a degree and qualification comparable to the above Bachelor degrees are admitted to the professional Master study program “Design Engineering”.

Equalisation of the Bachelor degree upon admitting an applicant to the design specialisation is done within an interview procedure, by reviewing the applicant’s portfolio and conformity of the knowledge and skills acquired in the preceding study process, as well as the conformity of the conferred qualification for the continuation of studies in the professional Master study program “Design Engineering”.

Equalisation of the Bachelor's degree in the specialisation of clothing and textile technologies is done based on the applicant’s documents of the preceding education and the knowledge acquired in the professional activity, as well as the conformity of the conferred qualification.

For example, in 2020 two students holding the engineering Bachelor's degree in architecture were admitted to the professional Master's study program “Design Engineering”. Prior to admitting the students, the study program “Architecture” completed by the students for receiving the Bachelor degree, as well as the practical assignments and study projects to be completed in the study process was carefully reviewed, The analysis resulted in concluding that several courses completed before can be equalised to the study courses completed by the students of the professional Bachelor study program “Materials Technology and Design”.

Recognition of study courses completed in the formal education is done within study programs almost every semester based on the student’s application, by presenting diplomas and transcripts of progress. Most frequently such cases are related to students willing to transfer from a study program implemented within RTU, for example, from RTU RTU Faculty of Architecture, from the University of Latvia, sometimes from Liepaja University, RISEBA University of Applied Sciences, the School of Business and Finance, Rīga Stradiņš University, Vidzeme University of Applied Sciences. The procedure does not cause any problems. The procedure of equalisation of study courses takes place according to the above referred RTU order No.02000-11/29 dated 04.04.2016. If a student or an applicant has completed one or several study courses in another study program in RTU or outside RTU (in a higher education institution in Latvia or abroad), an application should be submitted to the director of the study program requesting to recognise study courses completed elsewhere as passed within the framework of the new study program, by enclosing descriptions of the completed study courses and documents attesting the successful completion of these study courses. The director of the study program executed the recognition by himself/ herself or forwards the application to the academic staff in charge of the relevant study courses and requests them to perform an assessment of compliance with the study courses. Following analysis of the received documents, the resolution is recorded in the sheet of recognition of study courses by specifying the evaluation “not recognised”, “recognised in full scope”, “partially recognised” within the relevant CP range, additional requirements for recognition of the study course are added, if needed. Some study courses completed at the first level professional higher education institutions are also recognised in the Bachelor's study program. In case of necessity, an individual study plan is developed for the student to balance the study process.

For example, upon transferring from the RTU academic Bachelor study program ABA0 “Architecture” following the first study year to the professional Bachelor study program “Material Technology and Design”, 11 general and specialised study courses of the total volume of 35 CP were recognised and only one study course (the English language), which has to be completed in the volume of 2CP additionally, was partially recognised for the student. The individual study plan was prepared for the student by providing the study courses not completed in the 1st year and coordinating them with the other study courses until the end of the studies.

1.6. 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.

Assessment of student learning outcomes is carried out in accordance with the “Regulation on the Assessment of Learning Outcomes” (approved at the Meeting of RTU Senate on 27 May 2017, Minutes No 610), which is available on Studies Regulations page of RTU web page (English translation is Appendix 04 in the zip folder "List of Internal regulations"). Summative assessment system is used in appraisal of student achievements, it implies that the final grade is composed of numerous components.

In the course descriptions of the study programme there is a set of relevant knowledge, skills and competences and their evaluation system, defined learning outcomes for the achievement of which credit points are awarded.

Pedagogical methods used in the implementation of study courses, as well as assessment forms and methods are selected by the instructors responsible for the study courses in compliance with course curriculum and specifics of the programme, as well as student needs. A member of academic staff should inform students about particular assessment criteria at the fist lecture/practical class.

The main advantage of the summative assessment system is that the final grade is made up of several components. Therefore, the students may contribute to their final grade working during semester. Criteria for assessment of the study courses and individual/home tasks are published on ORTUS e-study system beforehand. During semester, the assessment for each home task, test, report, presentation and any other task is ascribed certain weight in the final grade. Exam grade may not exceed 50% of the final grade. Academic staff may take into consideration and also assess student attendance. Assessment structure for the study course is determined by the academic staff themselves, abiding the resolution of RTU Senate that the exam grade may not contribute more than 50% to the final grade. Selecting assessment criteria and methods for evaluation of student achievements, specifics of each study programme and learning outcomes are taken into consideration.

In order to advance professional pedagogical competences of the academic staff, courses and seminars on the newest pedagogical methods are organized regularly. Qualification advancement is provided at both the University and faculty level, organizing academic conferences and methodological seminars. The Centre for Academic Excellence has been established and successfully operates at RTU; it organizes various events aimed at professional advancement of academic personnel at the University level.

(In addition, see the description of each study programme.)

1.7. Description and assessment of the academic integrity principles, the mechanisms for the 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.

Since 2010 all students that gradate from any RTU study programme should upload electronic versions of their graduation papers in ORTUS portal in order to improve the quality of graduation papers, create a bibliographic database of the graduation papers and introduce an automated control system for detecting plagiarism. RTU uses two major plagiarism control tools in the study process:

1. Since 2015 graduation papers of study programmes of the study direction have been checked in the joint computerised plagiarism control system (JCPCS), which unites numerous Latvian universities and colleges. RTU uses the system in cooperation with the University of Latvia. This system is used to check graduation papers after their uploading to the ORTUS environment. JCPCS complements and extends plagiarism identification opportunities.
2. Starting from 20 December 2017, RTU has been having TurnitIn®, the world's leading tool for the correction of written papers and combating plagiarism that is used daily by millions of students and academics around the world. TurnitIn® tool is integrated with RTU ORTUS e-study system and provides full service of submitting, correcting, verifying the originality (plagiarism) and return of the submitted papers. TurnitIn® offers two main platforms: a platform that automatically checks for the percentage of non-genuine content (plagiarism) and a platform that allows to electronically correct the submitted papers. This tool is used to check all the electronic versions of graduation papers submitted for defence and further control measures are operatively implemented for potential plagiarism detection.

Graduation papers are checked in both systems in parallel, thus using the advantages of both systems. The developed Doctoral Theses are in a similar way controlled with extreme scrutiny. Since 1997, the Researcher Code of Ethics has been effective at RTU (see the file of Appendix 19 of the list of Internal regulations). Academic Integrity Code, approved at the RTU Senate meeting of 29 February 2016. The aim of the Academic Integrity Code is to strengthen academic culture and integrity in the academic environment of RTU, to explain the concept of academic integrity and related actions, to define main procedures in the examination of academic fairness violations (in Latvian available at https://www.rtu.lv/writable/public_files/RTU_rtu_studiju_reglaments_7.1.1.4..pdf, English translation is in the file of Appendix 38 of the list of Internal regulations).

There are procedures defined, how the report on the violation of the student's academic integrity is filled, registered, reviewed, and appealed. Informing and educating students about the aspects of academic integrity takes place both within the study courses and in specially organized seminars.

Both students and academic staff have access to the book "Glossary for Academic Integrity" published by RTU publishing house (available at http://www.academicintegrity.eu/wp/glossary/).

In addition, RTU participates in different initiatives that bring forward and solve academic integrity related issues. RTU is a member and one of the founders of the European Network for Academic Integrity (ENAI), where it is involved in active work sharing experience, keeping updated about academic integrity related issues, and organizing conferences. The Dictionary of Academic Integrity

Terms and Guidelines is one of the newest aids that has been developed and published by RTU Press. In the framework of Specific Support Objective (SSO) 8.2.3 of the project "Development of Efficient Management of Riga Technical University", RTU, in cooperation with the University of Latvia (UL) and Rīga Stradiņš University, develops educational aids, as well as participates in the establishment of the Latvian national academic integrity organization and development of plagiarism control tools.

The organisational units implementing the study programme have developed a control mechanism, i.e., the initial check is performed in the process of interim assessment, which is performed by the work of the Advisory Examination Commission. When the student comes to these examinations, he or she should submit the electronic version of the performed work and the paper is checked in free plagiarism control tools in presence of the student. When students draft their graduation papers, they are instructed about plagiarism and its consequences several times. Methodological materials contain detailed instructions on correct presentation of references. This process allows to reduce plagiarism and highlights faults in the student's paper, which needs to be rectified. The generally accepted "good practices" show that more attention should be paid to the papers showing 20 percent or more matches. A message is received from the system, when the match level is higher than 20%. The papers are examined, reasons of matches in the text are evaluated and a decision is made whether the student should be allowed to defend his or her thesis.

The IDT structural units implementing the study program have developed the mechanism of control of semester study assignments and graduation assignments based on the regular evaluation of the stages of performance of assignments a minimum of three times during the whole study semester. Every student submits and presents the results of the relevant assignment stage, participates in a discussion with the professors of the relevant course of the department or the department management and the leading professors of the study courses during the development process of the graduation paper. This allows following up on the progress of the work and seeing any indications of plagiarism in due time.

As the themes of the graduation papers are unique in all the study programs of the study direction, 20% text correspondence level has not been revealed until now.

1.8. Specify the websites (e.g. the homepage) on which the information on the study direction 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.

Detailed information on the study direction and the study programmes pertaining to it with the indication of the languages of instruction is available at RTU web page:

1. RTU web page in the section on education opportunities in the Latvian language (https://www.rtu.lv/lv/studijas) (responsible person – I. Bušovska, Head of the Admission Department);
2. RTU web page in the section containing comprehensive information on education opportunities in the English language (https://www.rtu.lv/en/studies) (responsible person – I. Tipāns, Director of the International Cooperation and Foreign Students Department);
3. Interactive web pages dedicated to RTU study directions, study programmes therein, as well as the detailed description of the offered study courses in the Latvian and English languages

(https://stud.rtu.lv/rtu/vaaApp/sprpub and https://stud.rtu.lv/rtu/discpub/list?english=true) (responsible person – G. Alksnis, Head of the Program Management and Curriculum Design Unit);

4. Web page designed for the foreign student target audience on RTU study programmes implemented in English and student mobility opportunities (https://international.rtu.lv, https://apply.rtu.lv) (responsible person – I. Tipāns, Director of the International Cooperation and Foreign Students Department).

II - Description of the Study Direction (2. Efficiency of the Internal Quality Assurance System)

2.1. Assessment of the efficiency of the internal quality assurance system within the study direction 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 direction and the relevant study programmes.

RTU operates pursuant to “Constitution of Riga Technical University” (approved by the Law “On the Constitution of Riga Technical University”, the law was adopted in the Saeima on 23 October 2014 (see the file of Appendix 01 of the list of Internal regulations.).

In order to efficiently control the implementation of RTU Strategy, RTU Strategy Management System has been established, which provides that strategic aims, activities and tasks are cascaded to the level of definite organizational units and their staff.

RTU has an internal quality management system in place in accordance with the RTU Quality Policy updated and approved at the meeting of RTU Senate on 25 September 2017, Minutes No 612 (see: RTU Quality Policy) and the RTU Excellence approach approved at the meeting of RTU Senate on 30 January 2017, Minutes No 606 (see: RTU Excellence Approach). Since the study direction is one out of 12 study directions implemented by RTU, and its internal quality system is closely related to RTU Quality Management System.

RTU Quality Policy is aimed at implementation of RTU mission and achievement of strategic aims – scientific research, academic, infrastructure and organizational excellence, and recognizability. The Quality Policy provides the framework for implementation of RTU Strategy, and the paths for development and improvement of research, study process and organization. RTU Quality Policy is reconciled with the ENQA standards and guidelines. RTU Excellence Approach and Quality Policy are reciprocally integrated documents, which determine that RTU employs the EFQM quality model.

Starting with December 2018, RTU has been a member of the European Foundation for Quality Management, having joined the global quality cooperation network.

RTU Excellence Approach (see the figure in file "RTU Excellence Approach") has been elaborated in order to promote purposeful development of the University as an excellent organization, and RTU Constitution, Strategy and Quality Policy are integrated therein; it is based on the Standards and Guidelines for Quality Assurance in European Higher Education Area (ESG) developed by the European Association for Quality Assurance in Higher Education and the basic principles of the EFQM Excellence Model.

The structure of RTU Excellence Approach (see the figure in file "Structure of RTU Excellence

Approach") is designed in accordance with the criteria of the EFQM Excellence Model and forms the basis for the maintenance of performance at a high level, a prerequisite for its continuous improvement, as well as for achievement of sustainable results of RTU activities and excellence. Student results are a separate criterion, they are also in part transferred to the main activity results; thus, the quality of the study direction is closely related to RTU quality management.

To promote introduction of the model of the EFQM total quality management system, as well as to assist in the compilation of a self-assessment report, a working group was established at RTU on 29 September 2017 (Rector's order No 01000-1.1/225), which comprised representatives of RTU administration, faculties and Student Parliament (18 in total).

Potential problems were identified and suggestions for improvement of RTU Quality Policy, including improvement of academic quality, were made at the meetings of the working group. In the period of one year, the working group considered compliance to nine criteria of the EFQM model and analysed 101 sub-criteria, having identified 133 problems in total and having made 146 suggestions. The priority problems were included in RTU Development Plan as tasks set for a definite term to be solved by the respective organizational units. Quality model review report is drawn up with regard to the Quality System, which identifies the areas that should be improved. Performance indicators and results of student polling are integrated in RTU Quality System.

Application of RTU Excellence Approach is based on process-oriented activities and includes clear process flow and their interaction. Striving for excellence, RTU actively works on process planning, definition of its aims and interaction analysis. RTU has developed criteria and methods for ensuring efficient process operation and management. RTU conducts the process analysis and provides recommendations and suggestions on process improvement, which are discussed with process managers and persons responsible for process procedures; later they are approved as performable tasks with a definite completion term. Task creation and control tools inbuilt in the Document System, reports on task performance at the organizational unit level provide the necessary support for achievement of performance indicators of the annual aims and tasks set in RTU Strategy. For example, development of the uniform study programme application structure and assessment criteria is one of the tasks for the process "Provision and Organization of Studies" approved in the system with the completion term set until 31 December 2020; they were developed and approbated on the study programmes developed within SSO 8.2.1 project.

The departments and institutes, faculty councils, the service of the vice-rector for academic affairs, the service of the vice-rector for development, the student parliament and the RTU Senate are involved in ensuring internal quality of studies at RTU. These institutions comprehensively evaluate the study directions and programmes to be newly created, as well as changes to study directions and programmes, evaluate annual self-assessment reports of study directions. The internal quality assurance mechanism of studies at RTU is functioning at the level of administration, faculties, study directions and study programmes of the university.

Study Direction Committees at RTU supervise academic activities in the respective study direction and are responsible for the curriculum of the study programmes within the study direction, including accreditation of the study direction. Members of student self-government are involved in ensuring the quality of the study direction and study programmes implemented therein; they actively participate in the work of the decision-making bodies of the University: RTU Constitutional Assembly, RTU Senate, RTU Senate commissions and faculty councils.

The study field "Manufacture and Processing" is among the twelve study directions implemented by RTU and its internal quality system is closely related to the overall quality system of RTU.

The commission of the study field performs an examination and forwards changes in the content or

structure of programs for approval to the Faculty Council, approves the self-assessment report.

The report on the improvement of the study field reflecting the main changes and assessing the quality of the study process is prepared every year for providing the quality of studies. In the course of preparation for accreditation of the study direction, on 10 November 2020, at the meeting of the commission of the study direction, the task force of the development of the self-assessment report was established and approved comprising administration representatives of RTU and the study direction, employers' representatives, academic staff and students representatives.

- The survey of the students of the study programs is performed twice a semester regarding the quality of work of professors and assessment of the study programs. The survey is performed electronically in ORTUS environment, the results are received by every member of the academic staff in person and the director of the program. The summary of the results is discussed at the department meetings, at the meeting of the Council of the Institute of Design Technologies (IDT.
- The survey of graduates is carried out following every graduation, the survey of employers and graduates of preceding years is carried out once in two years. The results are taken into account in the improvement of the study programs and discussed at the meetings of departments and the institute.
- At the defence of graduation papers, there are employers' representatives who express their opinion regarding the quality of knowledge of the graduates and recommend necessary improvements of the study programs and processes.
- DTI employees continuously follow up the compliance of the quality requirements of the premises and technical equipment, there are special classrooms with necessary means of multi media technology.

Also, members of the self-government of the students of the faculty who are active in the decision making bodies of the higher education institution: the Academic Meeting of RTU, the RTU Senate, the RTU Senate Commissions and the Faculty Councils, are involved in the provision of the quality of the study field and the study programs implemented therein.

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 procedures for the development of new study programmes within the study direction (including the approval of study programmes), the review of the study programmes, the aims, and regularity, as well as the stakeholders and their responsibilities. Description of the mechanism for obtaining and providing a feedback, including with regard to the work with the students, graduates, and employers.

Study programme development and revision processes are regulated according to the "Procedure for Application, Elaboration and Amendment of the Study Programmes" (published at https://www.rtu.lv/writable/public_files/RTU_studiju_reglaments_4.6._programmu_izstradasanas_kartiba_29.04.2019.pdf (in Latvian); the English translation is in the file of Appendix 06 of the List of the governing regulatory enactments and regulations of the higher education institution/ college), which in detail specify activity sequence and parties involved, starting with drawing up an application for new study programme elaboration and finishing with study programme closure. Procedures are reconciled with the effective national regulatory enactments pertaining to study programme licensing and amendment.

Revision of the study programme curriculum is the responsibility of the Study Direction Committee. The responsibilities and activities of the committees are regulated by the "Regulation on the Study Direction Committee" (approved at the RTU Senate on 3 December 2012, Minutes No 594; published at https://www.rtu.lv/writable/public_files/RTU_studiju_reglaments_4.7._studiju_virziena_komisijas_nolikums_29.04.2019.pdf, (in Latvian); the English translation is in the file of Appendix 07 of the List of the governing regulatory enactments and regulations of the higher education institution/ college).

Expert assessment of the study programme is performed by the Study Direction Committee, then – by the Faculty Council or the councils of several faculties involved. The expert assessment procedure is finalized by the Study Department. The Study Direction Committee evaluates the quality of the draft study programme and the compliance of its curriculum to the planned aims and tasks.

In order to analyse study directions and to receive feedback, RTU has developed a polling cycle:

- When starting studies at RTU, a survey of students is conducted about expectations from studies, availability of information, admission process. The survey is conducted electronically on the ORTUS portal.
- Each semester, the polling of the students at a study programme is conducted to find out student opinion about instructor's work quality and obtain an evaluation of the study programme. Polling is conducted electronically in the *ORTUS* portal, the results are received by each instructor personally and the head of the organizational unit. The summary of the results is summarised at department meetings, at the meeting of the Study Direction Committee and the meeting of the Faculty Council.
- After each graduation round, polling of the graduates of Bachelor and Master programmes is conducted. The results are taken into consideration in the improvement of the study programmes within a study direction and discussed at methodological seminars.
- Annual polling of Doctoral students and Doctoral alumni has been introduced, it is also planned to conduct surveys of Doctoral entrants. The polling on the admission procedure and study process has been launched. The summaries of results are published on the ORTUS portal. The results are taken into consideration in the improvement of the Doctoral study process and the quality of support provided to doctoral students.
- It is also planned to run regular centralised polling of RTU employers. Polling of employers presently takes place at the end of the internship of each student, as well as within the scope of development of study programmes.

From the spring semester of the academic year 2020/2021, a mid-semester questionnaire has also been introduced.

The following mechanisms are used to obtain feedback from employers.

RTU Council Convention, composed of representatives of different sectors, advises RTU Senate and Rector on the RTU Development Strategy. It has the right to propose an issue to the Senate and the Constitutional Assembly. The RTU Strategy and its development program are presented in the RTU Council Convention, the decision-making bodies, as well as to cooperation partners, industry associations and leading companies, with feedback and suggestions being incorporated into the RTU documents.

The involvement of stakeholders and the realization of major projects is the responsibility of the Vice-Rector for Strategic Development. He clarifies existing needs, coordinates key priorities and activities, implements recommendations and promotes the sustainable development of the RTU.

Employers, as providers of the internship of RTU students, after completing the practice, prepare

online feedback on the knowledge and skills of the student, thereby also assessing the relevance of the knowledge provided by the study programme to the needs of the industry.

Employers' feedback is obtained also from the Council Convention, composed of representatives of different sectors and industry associations, as well as from the assessments provided by employers on the portal prakse.lv (RTU is the most recommended university at https://www.prakse.lv/top for several consecutive years (information available only in Latvian)).

Feedback within study programmes is received through every semester student polling, regulated by the "Regulation on Student Polling for Assessment of the Study Process" (approved at the RTU Senate on 27 January 2014, Minutes No 577; published at https://www.rtu.lv/writable/public_files/RTU_anketesanas_nolikums.pdf (in Latvian); the English translation is in the file of Appendix 20 of the List of the governing regulatory enactments and regulations of the higher education institution/ college).

Study programme course abstracts and course programmes, methodological materials, newest educational literature and methodological instructions for study papers (reports, study papers, internship reports and graduation papers) are reviewed once an academic year.

Courses and seminars on the latest teaching methods are organised for academic staff, as well as attendance of courses to improve qualification is promoted. Academic staff and heads of study programmes participate in different experience exchange activities cooperating with universities of other countries, meeting representatives of respective institutions and businessmen, as well as discussing among themselves the latest developments in the sector, research papers and projects of students by analysing their results.

The Study Direction Committee analyses recommendations from employers and external experts, which are used as the basis for the improvement of the study programmes.

In order to receive feedback from RTU graduates, RTU Alumni Association has been established. It actively operates at the University (http://alumni.rtu.lv/, https://www.facebook.com/RTUAlumni/ (information available only in Latvian)) and runs an online community platform (https://rtuconnect.net/), which aims at developing alumni traditions. In order to ensure the transfer of experience from graduates, the RTU Alumni Association provides mentor training, database maintenance, as well as mentors and mentee matching. The RTU Alumni Association organizes various events, which bring graduates back to the University, allow for networking, cooperation among the graduates and with the University, and integration in University activities. RTU Grand Graduation Ceremony is a major event introduced by the RTU Alumni Association; it gathers the respective year graduates from all nine RTU faculties, academic and general staff, as well as guests.

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 direction and the relevant study programmes are communicated by providing the respective examples.

In order to promote continuous improvement of the quality of studies and provide students with the

opportunity to submit proposals and complaints on various study-related issues in accordance with the ESG, in the reporting period from 2013 to mid-2019, at RTU, the examination of students' recommendations and complaints was carried out; this was done by involving the structural units to which the applications related, as well as the student self-government of the respective faculty.

A new document was approved in 2019 and now Student complaints and proposals are considered in compliance with "Procedure for Submission and Examination of RTU Students' Proposals and Complaints" (published at https://www.rtu.lv/en/university/proposals-and-complaints and attached in the section "Other Annexes").

The Procedures stipulate how RTU students may submit suggestions and complaints concerning the study process and other issues and determine the terms for consideration of applications and summary of application statistics.

Under the new arrangements, a total of 137 complaints/proposals have been received between August 2019 and November 2020, 11 of which have been submitted anonymously. Of the submissions 30 were complaints, 80 were problems and 27 were suggestions across nine topics (subject: the number of complaints or problems / the number of proposals received):

- Study process: 53 / 10
- Sports: 4 / 2
- IT issues: 10 / 5
- Maintenance of infrastructure issues: 7 / 3
- Accommodation related: 74 / 1
- Scholarships: 3 / 1
- Foreign students' questions: 11 / 3
- Library: 1 / 0
- Other: 16 / 2

Evaluating the submitted complaints on the issues of the study process, 10 of them are related to the planning of study schedules, non-timely posting on the portal ORTUS e-study system, another nine are related to the communication between academic staff and a student. Complaints have also been received about remote and face-to-face lecture planning - students are not able to move from home to the faculty and vice versa within the breaks. Proposals have been received for the development of new study programmes, introduction of additional classes, development of training for teaching staff related to the use of Microsoft Teams and Zoom. It is offered to consider purchasing a Grammarly Premium subscription for students.

In economic matters, complaints have been submitted about the cleanliness of shared facilities in faculties and the quality of water at drinking water points. In student accommodations - for the unavailability of tumble dryers.

IT issues are mostly related to system overloads, due to which it is not possible for students to authenticate on the ORTUS portal. A recommendation has been received regarding the security of the ORTUS portal URL, which raises students' concerns about the secure transmission of their data.

Complaints about sports issues concern the amount of money awarded to sports undergraduate (100 euros) and graduate (10 euros) students.

Other complain were about alleged harassment and two suggestions for infrastructure improvements – the construction of roofed bicycle sheds, the lack of facilities around faculties and student accommodations and some applications about study payment issues.

The management of the study field "Manufacture and Processing" continuously supervises the study process, always listens to the students' objections and proposals, as well as follows up to

ensure that all the issues are resolved. At the beginning and middle of every semester, the directors of the study program and the director of the institute discuss the study process in the students' groups. The students' objections and questions regarding the organisation and content of the studies are clarified. They are analysed at the meetings of departments and the leaders of the relevant students' groups are notified about solutions. When objections expressed by students in relation to the study process and its organisation are resolved as described above, written complaints are rare.

Example. Due to restrictions of the study process during the pandemic, in the spring semester of the academic year 2019/2020 a complaint was received regarding the study course "Two and three dimensional spatial simulation". As the pandemic began, students no longer received information from the professor and there were no remote classes. Neither did students receive information about assignments and requirements of the exam for successful completion of the study course. The professor only started working with students 3 weeks before the end of the study semester. The head of the structural unit jointly with the director of the study program assessed the situation and agreed with the students that the study course should be transferred and implemented online in the autumn semester of the academic year 2020/2021. In order to contribute to the more efficient delivery of lectures, relevant technical equipment was purchased. The transferred study course was implemented online on the TEAMS platform and students had access to recorded lectures.

In the spring semester of the academic year 2019/2020 and in the semester of the academic year 2020/2021 again complaints were received regarding the inability of the professor of the study course "Mathematics" to organise online lectures and later regarding the incomprehensible methodology of presenting the topics to be learned and evaluation of assignments. Complaints about this particular study course were received from students in two groups. In the beginning, the director of the study field discussed this with the particular professor and the head of the Department of Engineering Mathematics of the Institute of Applied Mathematics by trying to find a resolution, however, as the situation did not improve and there were repeated complaints, the particular issue was resolved on the level of the Faculty by involving the deputy dean of the study and science activities. As the result of mutual communication, an agreement was achieved to replace the professor.

2.4. Provide information on the mechanism for collecting the statistical data, as developed by the higher education institution/ college. Specify the type of the data to be collected, the collection frequency, and the way the information is used to improve the study direction.

RTU Quality Policy provides the framework for implementation of the Strategy, the paths for development and improvement of research, study and organization processes. RTU Quality Policy and implementation thereof employ a fact-based approach - decisions are based on the acquired objective data, information analysis and monitoring.

RTU draws up quality reviews based on the analysis of processes and their results. Quality reviews are drawn up once a year, summarizing the data on performance indicators of RTU administration, core activities and support processes.

28 performance indicators characterizing process quality are set for one of the RTU core activity process "Organization and Management of the Study Process". The data are summarized once a

year for the previous academic year by study level and study programme.

Performance indicators characterize the quality of entrant enrolment process, study process planning and the quality of implementation of studies - implementation of the initial admission plan, number of matriculated entrants vs. number of entry applications, number of entry applications with RTU as the first priority vs. all matriculated students, number of graduates vs. total number of students, number of exmatriculated students (except for graduates) vs. total number of students, number of students with academic arrears vs. total number of students, number of students exmatriculated due to academic failure vs. total number of exmatriculated students, number of timely signed learning agreements vs. all signed learning agreements, etc.

Observing the current study programme performance, reachable qualitative or quantitative aims are set for the indicators when possible, e.g., 65 percent of graduates of RTU undergraduate study programmes continue studies at graduate study programmes.

The data in the quality review that is submitted to RTU administration are analysed by study level, by faculty and study direction. Indicators of numerous study programmes are compared with the general average RTU level.

The Study Department organizes further review and data forwarding to the faculties and directors of the study programmes, whereas process managers introduce the necessary improvements. Changes to the approved processes occur in cooperation with quality management specialists.

In addition to performance indicators characterizing study process quality, which are summarized in the review, a study programme quality visualization tool has been created in Power BI environment, which will be used to reflect Bachelor and Master study programme performance in an academic year with the help of radar chart. In the chart, study programme results at each study level will be presented comparatively - in relation to the best performance at the respective level. The tool is envisioned for the directors of the study programmes and faculty administration to facilitate collection of transparent information on each study programme performance considering numerous indicators simultaneously, as well as to rank the programme in relation to the best performance. It will be also possible to compare the programme performance in several academic years. The tool is currently at the development and test phase. Performance indicators of 11 study programmes are planned to summarize in the radar chart: academic staff vs. number of students, academic staff with scientific degree, ratio of graduates to the number of matriculated students, number of students who continue studies (not exmatriculated), proportion of foreign students, number of outbound mobility students, Bachelor programme graduates who continue studies at RTU, number of matriculated students from the respective Bachelor study programmes, average assessment of the study programmes in student polls, number of study materials published on ORTUS e-study system and applicability thereof, as well as financial revenue generated by study programmes per student. Comparative reviews of the study programmes results will be available to directors of all RTU study programmes. It is planned to develop and improve the tool for collection of statistical data necessary for evaluation of the study programme performance and data visualization within the framework of SSO 8.2.3 project.

In addition, RTU Study Department summarizes and annually submits until 15 October to the Central Statistical Bureau and the Ministry of Education and Science a statistical review "Review of the University, College at the Beginning of Academic Year 20_/20_" (Cabinet Regulations No 812 of 20 December 2016, Appendix 5 (https://likumi.lv/doc.php?id=287576 (in Latvian)). The Review contains the following information (sources of information and/or RTU employees responsible for data collection are indicated in parentheses).

- Distribution of students by study programme (Study Management System| Reports |

University Review at the Beginning of the Academic Year).
- Enrolment results (University Review at the Beginning of the Academic Year).
- Students having obtained a degree or qualification in the academic year (University Review at the Beginning of the Academic Year).
- Distribution of enrolled students by age (University Review at the Beginning of the Academic Year).
- Distribution of students by age (University Review at the Beginning of the Academic Year).
- Distribution of students having obtained a degree or qualification by age (University Review at the Beginning of the Academic Year).
- University staff in the reporting year as of 1 October (Administrative Office);
- Premise floor area (the Unit of Legal Provision in Real Estate Issues).
- University revenues in the previous year (Planning and Economic Analysis Unit).
- Budget expenditure of the University in the previous year (Planning and Economic Analysis Unit).
- Number of students, who reside in student hostels (Study Organization Unit).
- Number of students by the language of instruction.
- Distribution of enrolled students by place of residence (University Review at the Beginning of the Academic Year).
- Number of mobility students in the total number of students (University Review at the Beginning of the Academic Year).
- Number of mobility students in the total number of students who have obtained a degree or qualification (University Review at the Beginning of the Academic Year).
- Own revenue from allocation of the mobility student tuition fees by country in the previous year (International Cooperation and Foreign Students Department).
- Revenue from allocation of foreign financial study grants by country in the previous year (Project Financial Management Unit).
- Revenue from allocation of foreign financial study grants for research by country in the previous year (Project Financial Management Unit).

Summarized statistics on the number of students/graduates is used for the following purposes:

- Improvement of the study direction. For example, if at some study programme the annual number of student dropouts is much higher than the number of graduates who obtained degree/qualification, the causes of such a situation are sought for with scrutiny.
- If at some study programme the number of enrolled students decreases annually, the cause should be identified, and potential programme closure should be considered.
- Allocation of financing (for state budget funded seats).

Compilation of RTU information materials, press, etc.

2.5. Description and assessment of the integration of the standards set forth in Part 1 of the ESG. Specify which of the standards are considered a challenge and which require special attention.

In the context of the study quality assurance policy, one of the challenges to be emphasized is the organization of the RTU working environment so as to motivate the staff and students to realize the mission, vision and goals of the university and to ensure the excellent quality of the University activities. In the context of study programme development and validation, one of the challenges is

to reach agreement on the common structure and curriculum of separate sections for the study programmes submitted for licensing. It is promoted by the Study Department, which deals with developing the study programme description template and completing the sections applicable to the RTU in general. In the context of student-centred learning, teaching and assessment, perceiving the development of curriculum and study forms as one of the most significant challenges of today's higher education, RTU has established the Centre of Academic Excellence, which acts as a bridge between teaching and learning cultures. The challenge lies in a relatively low activity of local students in using exchange programmes for studies abroad. To compensate for it RTU promotes international opportunities by inviting guest lecturers and conducting study courses with foreign students. In the context of information management, it is considered how the data on employment of graduates from the State Revenue Service could be linked to specific study programmes. In addition, in this context, the question of choosing the most appropriate method for mapping study programmes is evaluated taking into account the great variety of RTU study programmes. Active professional development of the academic staff is also taking place within SSO 8.2.2 project "Strengthening the academic staff of Riga Technical University in the areas of strategic specialization"

The description of the integration of the standards included in the first part of the ESG is given in the appendix "ESG_standards_integration_description".

II - Description of the Study Direction (3. Resources and Provision of the Study Direction)

3.1. Provide information on the system developed by the higher education institution/ college for determining the financial resources required for the implementation of the study direction and the relevant study programmes. Provide data on the available funding for the relevant study programmes, as well as the sources of the funding for the scientific research and/or artistic creation activities and their use for the development of the study direction. Provide information on the costs per one student (for each relevant study programme of the study direction) by specifying the headings indicated in the calculation of costs and the percentage of the funding among the indicated headings.

According to the Conceptual Report “Introduction of a New Higher Education Financing Model in Latvia” approved by the Cabinet of Ministers on 29 June 2015 (http://likumi.lv/ta/id/274944-par-jauna-augstakas-izglitibas-finansesanas-modela-ieviesanu-latvija, in Latvian), Latvia has introduced structural reforms in the sector to ensure the development of an efficient and sustainable higher educational system. A three-pillar funding model has been introduced to reconcile the supply offered by higher education with the needs of Latvia's economic development and labour market, high-quality research-based higher education content and performance management in higher education institutions. The base funding for the provision of the study process is the 1st pillar, performance funding is the 2nd pillar, and development funding is the 3rd pillar.

The first pillar, or base (base funding), is implemented through state budget funded study seats. Determination of the number of state budget funded study seats are regulated by Sections 51 and 52 of the Law on Higher Education Institutions (http://likumi.lv/ta/id/37967-augstskolu-likums#p-50515, in Latvian).

RTU funding from the basic state budget is made up of the study base financing corresponding to the list of study programmes and the number of students; it is used to cover such expenses as utilities, taxes, infrastructure maintenance (including data for the Student and Graduate Register), purchase of equipment and supplies, staff remuneration, and funding for research activities.

The number of study seats is allocated after discussions with the Ministry of Education and Science. Funding from the state budget is allocated for full-time studies.

The amount of study base funding is determined on the basis of the number of study seats determined by the state at RTU, as well as the state-defined study seat basic expenses and study cost coefficients in the thematic areas of education.

Study cost coefficients for thematic areas of education are indicators that determine the amount of study seat costs in the respective thematic area of education in relation to the basic costs of the study seat.

The cost coefficients for the study programmes in the thematic areas of education for Bachelor and professional study programmes are set by in Appendix 1 of Cabinet Regulations of 12 December 2006 “Procedure for Financing Higher Education Institutions and Colleges from the State Budget” (https://likumi.lv/doc.php?id=149900, in Latvian) (further in the text - the Regulations).

Values of study cost coefficients are 1.5 times higher for Master study programmes and three times higher for Doctoral programs than the study cost coefficients specified in Appendix 1 to the Regulations for the respective thematic area of education.

The amount of the study funding granted to the institution of higher education or college from the state budget for the implementation of Bachelor, professional and Master study programmes is calculated using the following formula:

Fs = Tb x [S(ki x ni) + 1,5 x S(ki x mi)] + Sb x S(ni + mi), where

Fs – the amount of study financing;

Tb – basic costs of the study seat;

ki – coefficient of the study costs in the relevant field of education (Appendix 1 to the Regulations);

ni – the number of study seats for a higher education institution or college at undergraduate and professional study programmes in the relevant thematic area of education;

mi – the number of study seats at the Master study programmes in the relevant thematic area of education;

Sb – study seat social security expenses at undergraduate, professional and Master study programmes (Appendix 2 to the Regulations).

The basic costs of a study seat and the social security expenses of a study seat are determined in accordance with Appendix 2 to the Regulations.

Each year, the Ministry of Education and Science calculates the basic costs of a study seat for the following budget year and, by November 1 of the current year, coordinates the calculations with the Ministry of Finance and those Ministries which have higher educational institutions and colleges subordinated to them.

RTU funding from the state basic budget for the provision of study seats in the respective academic year is distributed in accordance with the decision of RTU Senate “Methodology for the distribution and use of funding for the structural units of RTU in academic year 2020/2021” (see the file of Appendix 16 of the list of Internal regulations; hereinafter – the Methodology). The Methodology is

reviewed and revised every year and is subjected to any necessary changes.

RTU has a decentralized budget, and each organizational unit is allocated a separate budget. In a general sense, a budget is a plan of revenues and expenditures for a specific period of time, work, event or function. The revenues and expenditures of RTU shall be administered in accordance with principles approved by the Senate or as stipulated by the Vice-Rector for Finance.

According to the Budget Allocation Methodology, the financing is allocated to the organizational units either according to the financial or budget year or immediately after receiving the financing. The financial or budget year of RTU organizational units is from October to September of the following year, and for this period the financing is calculated and distributed:

- Subsidy or basic budget funding (training of state budget funded students) is divided into monthly limit – 1/12 of the estimated annual funding per month is allocated to the organizational unit;
- Tuition fee funding (training of tuition fee-paying students, including funding paid by students for settling academic arrears) is allocated twice a year (in October and April) as a monthly limit – 1/6 of the estimated funding per semester is allocated to the unit monthly;
- Performance funding (research support funding) is allocated as a monthly limit – 1/12 of the estimated annual funding is allocated to the unit per month;
- Research base funding (research support funding) is allocated as a monthly limit – 1/12 of the estimated annual funding is allocated to the unit per month;
- funding for foreign student fees is distributed four times a year, taking into account that the largest amount of the planned workload is allocated to the structural unit at the beginning of each semester (October and April), the remaining part of funding - at the end of the semester.

Each head of the RTU organizational unit is provided with remote access to operational financial information on the unit's budget, including the envisaged workload and correspondingly allocated funding for the implementation of study programmes and study courses in subsequent periods. Based on this information, the head of the organizational unit plans the work of the unit at the beginning of each financial or budget year, including remuneration issues for academic staff members who are subordinate to the head of the unit, and develops a procurement plan for the following year in compliance with the implementation and development of the study programme or study course, etc.

According to the World Bank research on higher education governance in Latvia, which was conducted in 2017 and 2018, the World Bank concluded that RTU used the opportunities offered by the system-level funding model reform to gradually adjust the internal distribution of decision-making powers by strengthening the position of deans. Prior to the introduction of the second pillar of the state funding model, RTU funding was provided to units below the level of faculties. To address the issue of weak positions of deans, more than half of the new 2nd pillar performance income is used to provide funds to faculties where the dean is the budget holder. First, it opens up new opportunities for faculty-level strategic development. Second, deans now have greater opportunities to ensure the development of faculties, which is their responsibility. Third, since the academic year 2019/2020, deans of the faculties have additional funding from the tuition fees of foreign students.

In the academic year 2019/2020, RTU has made changes in the Methodology to ensure that the basic state budget funding for the provision of study seats is distributed by study programmes and thematic areas of study courses, ensuring precise distribution of funding according to the indicators by which RTU receives the state budget funding. In addition to the seats financed by the state basic budget, the study programme financing also consists of tuition fee revenue from the resources of

natural or legal persons, which can be divided into two subgroups:

1. revenue from local fee-paying students;
2. revenue from foreign fee-paying students.

Funding from local fee-paying students is allocated in compliance with the Methodology where, in order to provide greater opportunities for the development of fee-based study programmes, for several academic years, a significant amount of the funding received has been channelled to the head of the study programme, who may appropriately use this funding to renew facilities and attract higher-level specialists for the implementation of the study process, etc.

Funding from foreign fee-paying students in a respective academic year is allocated in accordance with the Resolution of RTU Senate On Approval of the "Methodology for Allocation of Funds for Study Process Provision at the International Cooperation and Foreign Students Department" in the Respective Academic Year (see the file of Appendix 41 of the list of Internal regulations; hereinafter – Methodology2). Methodology2 is revised and approved every year taking into account necessary changes.

In the academic year 2019/2020, RTU made significant changes to Methodology2 with an aim to bring it closer to the Methodology governing budget allocation, thus facilitating the work process of the persons responsible for the implementation of the study programmes – both by aligning funding allocation periods and principles. The new Methodology2 provides funding for the structural unit responsible for the implementation of the study programme for its development similarly as in Methodology. However, two new coefficients are introduced in the calculation of study course funding - the correction factor for the number of students and the sustainability coefficient of the study programme, as well as whether foreign students acquire the study course together with local students. The financial surplus, which is formed from the application of both coefficients and the acquisition of joint study courses, is directed to the structural unit responsible for the implementation of the study programme.

Analysing the financing procedure of the study programmes and the study directions at RTU as a whole, it can be seen that the state basic budget and local fee-paying student funding, in the long run, are determined taking into account the basic principles established by the state. In the process of determining the amount of funding, the study cost coefficients of the thematic areas of studies and the values of the study cost coefficients according to the level of the study programme, as well as the number of students at the study programme and the study courses implemented therein are taken into account. As mentioned above, by using study cost coefficients of the thematic areas of studies, it is possible to determine the amount of financing required for the implementation of a particular study programme and study course. In the Methodology for the academic year 2018/2019, RTU Senate approved that in the future the study cost coefficients of the thematic areas of studies would be applied individually to each study course of the study programme, thus ensuring an even more appropriate amount of financing for the implementation of study courses included in the study programmes. In order to implement this system, the Expert Committee was established by order of the Vice-Rector for Academic Affairs, who determined thematic areas of studies for each study course. RTU has the following thematic areas of studies and the applicable coefficients:

Thematic area of RTU study courses	**RTU coefficient**
Applied arts and design	3.5

Textile technology	2.9

From the academic year 2019/2020, similar principles are introduced also in Methodology2 and applied to study programmes, where the total number of foreign students in all academic years is greater than or equal to 90. The study programmes with less than 90 foreign students have a support mechanism, which envisages financing from the total funding of the foreign students, in order to ensure an adequate amount of funding for the implementation of the study courses of the study programmes.

In order to ensure the functioning and sustainable development of study programmes, RTU has been improving the Methodology and Methodology2 for each academic year in accordance with changes in the external and internal environment, thus also eliminating possible risks in the implementation process of the study programme or its study courses. The transition process involves all stakeholders, thus ensuring transparency, as well as a transparent decision-making process. The required changes are at first initiated by RTU Vice-Rector for Finance, and additional changes can be initiated by any RTU employee by submitting a request to RTU Vice-Rector for Finance or to the Finance and Budget Committee of RTU Senate. The Finance and Budget Committee of RTU Senate consists of 20 senators (the count might vary) - deans, heads of organizational units of faculties, professors, as well as student representatives, who have voting rights, as well as nine RTU Senate advisors, who are mainly representatives of various administrative units, such as vice-rectors, heads of departments etc. Once the Finance and Budget Committee of RTU Senate has considered and evaluated the proposals, it shall propose amendments to the Methodology or Methodology 2 or develop a new version of the document(s) for the next academic year for approval by the RTU Senate 50 senators. It should be noted that historically changes in the Methodology or Methodology2 have been proposed after performing a thorough analysis, including mitigation of their possible negative impact on the implementation of study programme courses.

The attached file "Financing of study field" provides information on financial resources of the study programmes included in the study direction "Manufacturing and Processing" for the period of 2013–2020.

The total funding of the study field during the reporting period from 2013 to 2020 has been 5,937,655.05 EUR (see Figure 3.1. Total funding of the study field "Manufacture and Processing" in the reporting period (2013-2020)). From the beginning of the reporting period until its middle point (2015/2016), the funding was volatile by increasing rapidly and decreasing again, however, during the IDT funding has been stable with an increasing trend during the last three years. In the academic year 2019/2020 the funding has reached the amount of 1,003,147.44 EUR. The increase compared to the last year (2018/2019) amounts to 95,046.27 EUR or 9.47%.

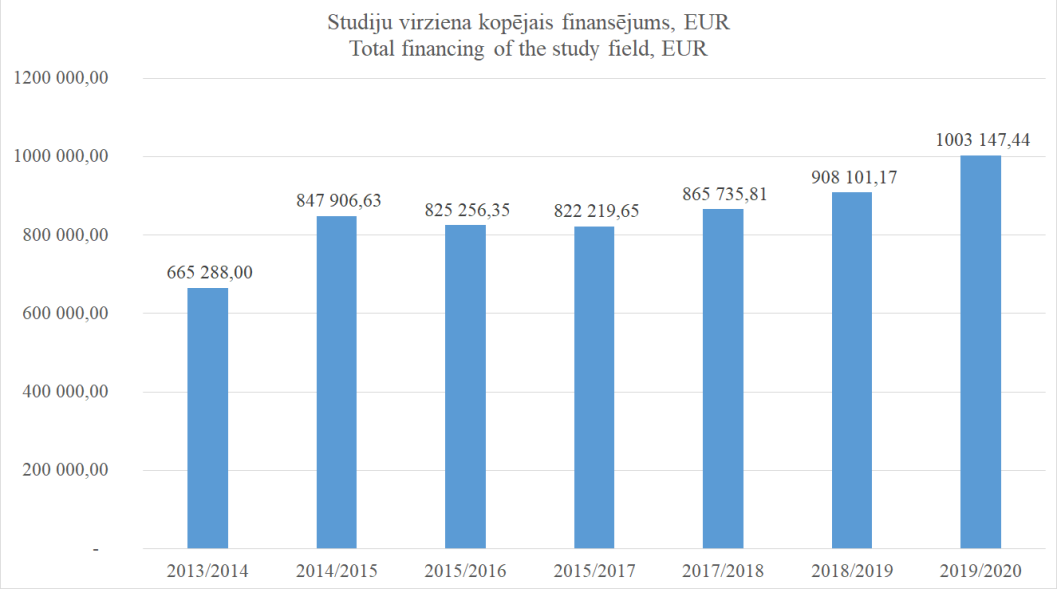


Figure 3.1. Total funding of the study field “Manufacture and Processing” in the reporting period (2013-2020).

The study field “Manufacture and Processing” is mainly (98.85%) funded by the state grants (see Figure: Split of the funding of the study field “Manufacture and Processing” per types of revenue), however, a small part (1.15%) is also income from tuition fees paid by local and foreign students. During the reporting period, the total revenue of students’ fees has amounted to 68,141,81 EUR, of which amount 44,587.00 EUR represents the income from tuition fees paid by local students and 23,554.81 EUR were received as tuition fees of foreign students. IDT started implemented the study program “Clothing and Textile Technology” in English in the academic year 2018/2019, and this fact explains the low income of the tuition fees from foreign students.

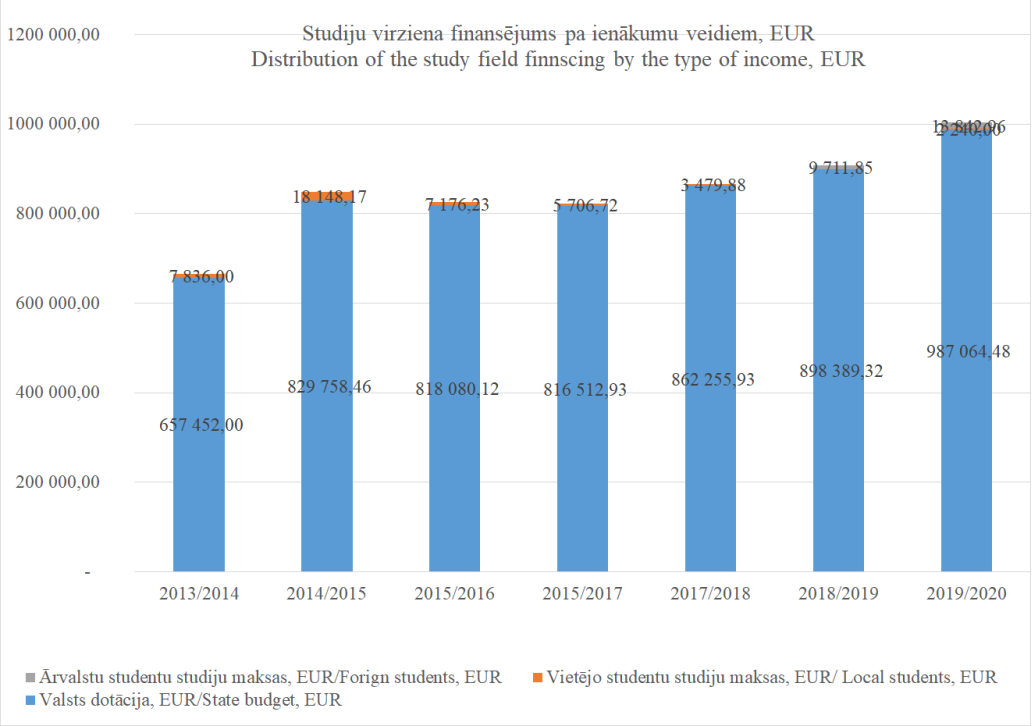


Figure 3.2. The split of the funding of the study field “Manufacture and Processing” per type of revenue

The costs per student have changed slightly during the reporting period and there has been a similar increasing trend in all the study programs. The costs have increased by 12.24% by

comparing the costs per student at the beginning of the reporting period (2013/2014) and at the end (2019/2020). The increase started with 4.32% in the academic year 2017/2018, followed in the academic year 2018/2019 with 4.47% and increased by 3.98% in the academic year 2019/2020 (see Figure: Costs per student of the study field “Manufacture and Processing” in the reporting period (2013-2020) per study programs). The increase of the costs per student is related to the overall increase of funding in the study direction.

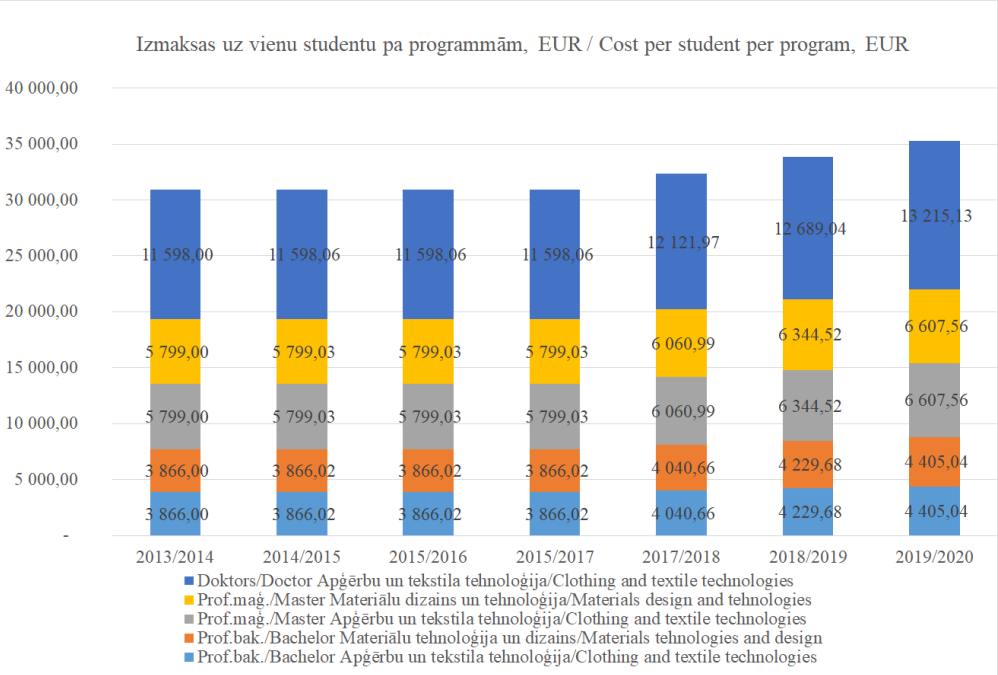


Figure 3.3. Costs per student of the study field “Manufacture and Processing” in the reporting period (2013-2020) per study programs

Research base funding (base funding provided by the state) is allocated among faculties according to the performance-based output indicators, i.e., the number of publications (weighted by impact and citation), money attracted by research projects and industry contracts, and defended Doctoral Theses (considering also the time it takes to complete Doctoral studies). The calculation is made based on the transparent methodology, which was approved by the Scientific Council (the document: “Methodology for Allocation of Research Base Funding to RTU Organizational Units”) on 20 November 2018. A decision regarding allocation of the budget among faculty institutes is made within faculties (by the Faculty Councils).

RTU also makes three project calls a year with internal funding. The 1st project call aims at supporting the publication activities of young scientists. The 2nd call supports projects where RTU cooperates with industry partners, and this call is aimed at promoting inter-faculty and inter-disciplinary research within six research platforms of RTU. The goal of the 3rd call is to involve graduates in the research process. The regulation documents are usually approved by the Scientific Council of RTU. However, the decisions regarding the selection of particular researchers or projects are made by expert groups organized by the Office of Vice-Rector for Research, on the faculty level or the research platform level (Council of Coordinators of Research Platforms; decision of RTU Senate No. 600 “On Approval of the Regulation of Coordinators’ Board of the Research Platform at Riga Technical University” as of 23 May 2016. Projects are administered by the Office of Vice-Rector for Research. The Office also coordinates the administration of the externally funded research projects, e.g., within Horizon 2020 program and others. Research projects funded by the EU Structural Funds are administered by the Office of Vice-Rector for Strategic Development.

The Internal Research Excellence Grant for young scientists is a new initiative, with an aim to

attract talented young researchers to RTU and provide with funding, which allows establishing new research groups in a prospective research field. Funding for a 3-year period is based on international competition under conditions similar to EC ERC grant, and international call and evaluation performed by external, i.e., foreign well-recognized researchers. The final decision for awarding the grant is made by the Scientific Council of RTU.

RTU Research Support Fund (decision of RTU Senate No. 585 “RTU Regulation of Research Support Fund” as of 15 December 2014) aims at providing financial support for various research related activities, such as support for maintenance of research equipment, protection and licensing of intellectual property, covering of expenses related to the Doctoral study process, publishing of scientific journals, participation and organization of scientific conferences, support to researchers in establishing new laboratories in a prospective research field. The Research Support Fund is an instrument to support research activities, which foster the development of strategically important research fields. 10 % of the research base funding (state budget funding) is allocated to the Research Support Fund every year. Establishment of seven new laboratories or centres has already been supported by the Fund by June 2020, e.g., RTU High Energy Particle Physics and Accelerator Technology Center (for cooperation with CERN), Biochip Laboratory, Scientific Laboratory of Experimental Mechanics of Materials, Scientific Laboratory of Electromechatronics, Research Center of Communication System Technologies. Research Laboratory of Technologies of Electrical Engineering and Ergonomics. Scientific Council has decided to support on competition basis at least one new prospective research direction every year (decision of RTU Scientific Council No. 04000-3/09 dated 21.09.2020.

In the academic year 2019/2020, 54 RTU doctoral students received a doctoral research grant. Financial amount for one doctoral grant was 10,000 EUR. Beneficiaries were elected to the position of research assistant or researcher. The aim of RTU doctoral grants is to support research related to the doctoral thesis and to promote the defence of the doctoral thesis and to promote the defence of the doctoral thesis in the 4th year after the commencement of doctoral studies.

3.2. Provide information on the infrastructure and the material and technical provision required for the implementation of the study direction and the relevant study programmes. Specify whether the required provision is available to the higher education institution/ college, availability to the students, and the teaching staff (the specific equipment required for the relevant study programme shall be indicated in Part III, Chapter 3 below the respective study programme).

The construction of RTU Ķīpsala campus began in 1965 with the aim to create a unified study and research centre. The construction process is underway, and it is envisaged to host the majority of university students in Ķīpsala from 2021. After completion of the construction, RTU Ķīpsala campus will become the most modern engineering study centre in the Baltic States.

The issue of sustainable development is taken into account in the construction process of the campus. Recognizing its concern for sustainable development and demonstrating its willingness to engage in the promotion of sustainable development, RTU has joined the Sustainable Development Solutions Network, which seeks to achieve the 17 UN Sustainable Development Goals (SDGs) by 2030. RTU is currently the only organization in the Baltic States that has been admitted to the network.

Through its networking activities, RTU, as a higher education and research institution, has

prioritized the achievement of seven UN SDGs that coincide with RTU research platforms. RTU considers the provision of quality education and the promotion of lifelong learning to be its primary goal. RTU also intends to contribute to research and innovation in sustainable and modern water technologies, power systems, infrastructure and urban environment. The University is also committed to promoting the creation and distribution of sustainable products.

RTU buildings are equipped with state-of-the-art climate control equipment, technical solutions that are remotely controlled and provide the opportunity to track energy consumption to make buildings more comfortable for students, academic staff, researchers and guests. One of the results achieved in the development of RTU infrastructure is the participation in the Green Metric Ranking (https://greenmetric.ui.ac.id/rankings/overall-rankings-2020/rtu.lv), which recognizes RTU Ķīpsala campus as the 40th greenest campus in the world and RTU – as the 95th greenest university in the world. In the Baltic region, RTU is a leader in terms of green thinking infrastructure.

To reduce human impact on the environment and climate change, RTU is committed to introducing the concept of Green Ķīpsala at its campus by 2023. To achieve the goal, RTU is improving its infrastructure in compliance with sustainability principles, changing student and staff habits, and using innovative green products and technologies developed by RTU researchers in Ķīpsala campus infrastructure.

The infrastructure of Ķīpsala campus provides students, staff and guests with all the necessary services and utilities, e.g., it is possible to park a bicycle and a car, quench one's thirst at water drinking points. Developing the infrastructure, care is taken of all groups of people, including people with disabilities: each building has parking lots, easy access to classrooms, laboratories and other facilities, the use of Braille to provide essential information, as well as all sanitary facilities are designed according to the requirements. The association of people with disabilities and their friends APEIRONS (https://www.apeirons.lv/) commends RTU for its achievements in infrastructure-related issues for people with disabilities.

In RTU Ķīpsala campus, there are currently 54 classrooms, 187 laboratories, 19 special training rooms, 10 computer classrooms, 12 workshops and several research centres of national importance. The campus also houses a hostel with 950 beds and a special area for people with disabilities.

Foreign students, visiting lecturers and university guests can use the renovated RTU student accommodations (Āzenes 22a, Riga).

Other elements of RTU infrastructure are also available for the needs of students and lecturers - canteens and cafes located in each of the RTU complexes, photocopiers, hostels, RTU sports and recreation centres, swimming pool, etc. RTU premises are equipped with drink and snack vending machines.

Wi-Fi is provided in all classrooms of the campus which allows students to access study materials placed on the RTU study portal ORTUS.

IDT is located in the renovated, modern study building promoting creative thinking at Ķīpsalas Street 6. The infrastructure is well developed, the public transportation, catering, sports facilities are available. The total floor space of the building is 10,462.78 m^2 on four floors above the ground. IDT occupies 6602.90 m^2 of the total floor space of the building. At the building there are bicycle parking and more than 50 car parking, access to people with restricted mobility is provided in the building. In the building, there is a lift, an open cloakroom, potable water and sanitary facilities are accessible on every floor. In the building, there are study rooms, classrooms, laboratories and offices of academic staff, rooms for seminars.

Table 3.1.

Premises of IDT at Ķīpsalas Street 6, Riga

No.	Use of the room	Number of rooms	Useful floor space m2
1	Meeting/ presentation room	3	175.7
2	Design room/ computer class	2	133.2
3	Study classroom	4	224.65
4	Offices of academic staff	17	333
5	Work space/ workshop	6	745.9
6	Laboratory	14	564.7
7	Auxiliary room	3	35.9
8	Storage	2	81.4
9	Students' administration and record-keeping	1	41.5
10	Kitchen	2	15.66
	Total:	**54**	**2351.61**

IDT uses also shared premises for the study needs. Room No. 228 is used for the needs of product design, it is a computer class equipped with the computer assisted software for product design, like AutoCad, SolidWork etc. As from the academic year 2015/2016, the design laboratory (the computer class 228) with 30 new computers is managed by the RTU Study Department, however, it is also used by the students of the study programs implemented by the study field "Manufacture and Processing". The study process takes place also in classroom 117 which is intended for more people in a group and is suitable for delivering lectures and performing the group work of students.

All the rooms intended for the study process are equipped with modern multimedia hardware, i.e. a computer with the Internet connection, a system of speakers and an overhead projector, which allows providing the study process compliant with modern requirements (Table 3.2). In some rooms there are interactive boards. The provision of premises is followed up continuously, the worn equipment is repairs or its parts are replaced as necessary, to avoid disturbances to the study process. In the academic year 2017/2018, 16 new computers were purchased for the CAD/CAM laboratory of clothing and textile products design (224). In the laboratory of simulation and designing computers were updated (225).

Table 3.2.

Equipment accessible for students and the academic staff of IDT

No.	Equipment	Number
1	Portable/ tablet computer	12

2	Desktop computer	79
3	Monitor	84
4	Copy machine/ scanner	6
5	Projector	17
6	Printer	4
7	TV set	1
8	Plotter	1

For the majority of the academic staff a well-equipped work desk is provided in the rooms intended for the academic staff: 102, 107, 108, 204, 215-222, 226, 239, 430-432. The academic staff has access to desktop or portable computers, the shared room for copying, scanning and printing. The academic staff may connect to the above equipment remotely and send a document for printing from their desks.

Table 3.3.

Shared equipment accessible for students and the academic staff of IDT (shared with other RTU units)

No.	**Equipment**	**Number**
1	Desktop computer	33
2	Monitor	33
3	Projector	3

IDT implements Bachelor`s and Master's study programs related to product design and designing. For the development of professional skills, the students of IDT have access to several laboratories and workshops with the equipment needed for the design and production of products. The range of equipment and auxiliary devices is supplemented on regular basis, also regular maintenance is performed by purchasing everything needed for high quality work performance.

The specific equipment accessible to the relevant structural unit is specified in table 3.4. More extensive information about the laboratories at the disposal of the study field and their equipment is available in the descriptions of study programs and annexes.

Table 3.4

Specific equipment accessible to the structural unit

Type of equipment, software	**Specific equipment, software**

Research equipment of textile materials	Sweating Guarded Hotplate M259B, SDL Atlas. Martindale Abrasion and Piling Resistance Tester, Air Permeability Tester, Wrinkle Recovery Tester, Crease Recovery Tester, Shirley Stiffness Tester, Crockmeter/Rubbing Fastness Tester, Fabric Drape Tester, Spray Rating Tester, Universal Testing Machine Instron with software for mechanical properties identification of fibre, threads and fabrics, Q-Sun Xe-2 Xenon Test Chamber, BINDER Constant climate chamber, Tumble Dryer, Washing Machine, Water Resistance Testing Machine, Electronic Balances, Yarn Twist Testers, Yarn Unbalance Tester, Yarn Strength Evaluation Tester Under Multiple Tension, Optic Microscopes, Yarn Examining Machine, Wrap Reel, Dynamometre for determination of the strength of fibre strands.
Simulation and design software	SketchUp, ArchiCad, SolidWork, Autodesk 3DS Max, AutoCad, Adobe Photoshop, Adobe illustrator, Adobe Indesign, Adobe Dreamweaver, Comsol Multiphysics, Revit, MatLab, MS Office + MS Visio.
Clothing and textile CAD/CAM	Grafis CAD Software, Lectra, Assyst, Comtense, Pe-design, Koppermann, Tex-Design, the system of computer controlled record of work-time use SSD.
Research equipment of wood materials	Atomic force microscope, viscometers (for determining the viscosity of liquids), optic microscope (100x magnification and a video recording function), ultrasound mixer (in a set with an electrical spinning device), calendering machine (pressing of sheet samples with controlled pressure and temperature) and a device for determining the surface gloss, DVG device. A compressor in a set with AFM and a portable pH metre, as well as a small-scale vacuum pump and heating stove and a mixing mixer. An optic microscope with x20 magnification, conductivity meter, thread scales, two magnetic mixers. Felder: Spindle moulders, Sliding table saw, Band saw, Vertical drilling machine, Planer-thicknesser machine, Dowel boring machine, Horizontal mortiser machine, Belt sander machine, Edgebander machine, Frame press and mounting tables, Auxiliary surfaces, Scaffolding, Vacuum press; CNC milling- engraving machine; Various Festool power tools.
Measurements laboratory	A magnetron sputtering device (applying metal and semi-conductor nano-layers onto various surfaces). An electrical spinning device (production of nano-fibre from polymeric liquids). A thermal cabinet for large samples leased from Bior. Autoclave (for sterilisation), thermal cabinet (thermal treatment of samples) Bruker AFM atomic force microscope; Permatest SENSORA device for determining the heat resistance and vapour permeability of cloth. Fungilab viscosimeter (the possibility to determine the viscosity and electrical conductivity of liquids). Motic microscope with a camera and 100x possible magnification. Magnetic and mechanical mixers. Rhopoint device for determining the surface gloss.
Equipment of anthropometric measurements	The human body 3D scanning device Vitus Smart XXL® (Human Solutions Group GmbH) with the data processing system AnthroScan. Tools: anthropometers, measuring tapes, calipometers for obtaining the measurements of the human body by manual methods. Computer systems: CAD/CAM system Assyst with the virtual prototyping module Vidya.

The more extensive description of the laboratories intended for scientific research and their

equipment is available in the descriptions of the Bachelor, Master and Ph.D. level study programs.

The study process of the study field “Manufacture and Processing” is related also to other RTU units, therefore, IDT students use also the infrastructure and the material technical provision of these units. Some study courses related to chemistry, physics and materials science are implemented at P. Valdena Street 3/7 and provided by the academic staff of other units of FMSAC. Several study courses are provided by the F academic staff. Also, FEEM located at Kalnciema Street 6, FCSIT at Daugavgrīvas Street 2, FESHC at Kronvalda blv. 1; the Faculty of Electrical Engineering and Environment Engineering at Āzenes Street 12 participate in the implementation of the study programs of IDT.

The students of the study field “Manufacture and Processing” perform scientific research within the scope of the Master and Ph.D. thesis, as well as laboratory assignments mainly at one of the fourteen laboratories of IDT, six workshops and two design classes/ computer classes. Scientific research can also be performed in other RTU units by using the material technical provision available there. There is very good cooperation with the Institute of Technical Physics, the Institute of Polymer Materials and the Institute of Silicate Materials, the Institute of the General Chemistry Technology, the Institute of Biomedicine Engineering Sciences and Nano-technologies, etc.

The infrastructure and the material technical provision and its accessibility to students and the academic staff conform to the specifics and implementation of the study direction.

Owing to a high level of digitalization, the available infrastructure and material and technical facilities for the implementation of the study direction and corresponding study programmes provide an opportunity to increase the University’s competitiveness, improve operational quality and efficiency, as well as to make information available by integrating IT solutions into administrative, academic and research processes of the University and providing administrative and academic staff with modern, reliable, secure and unified IT infrastructure and quality IT services.

The Information Technology Department works in three areas:

1. Creation, development and maintenance of an integrated information system of RTU providing support for administrative, academic and research work of RTU;
2. Provision of high-quality and uninterrupted voice and data communication services throughout the territory under the control of RTU, as well as maintenance of RTU data centres and key network resources;
3. IT service support, incl. providing information on new IT solutions, giving necessary consultation and organizing IT training.

To ensure easy and efficient identification of IT users, an IT user identity management system has been introduced; as a result, each IT user has a unique electronic identity that is valid in all information systems. In addition to the aforementioned, a user session management system is ensured in IT systems, which means that there is no need for IT users to re-authenticate when logging in to RTU information systems. It gives the experience of using a unified integrated information system without having to memorize different identification data and re-enter them, implementing different IT application scenarios.

All IT users are provided access to the centralized portal ORTUS (https://ortus.rtu.lv – screenshots of the interface are attached in “RTU IT sistēmu saskarnes / Screenshots of RTU IT systems”), which functions as a single digital gateway, combining information from all RTU information system components and providing users with an easy-to-use way of accessing the directory of all IT services in one place.

The Centralized Study Management System is used for efficient administration of the study process, which ensures digital provision of the study life cycle, incl. Electronic Register of Study Programmes (its public part is available at https://stud.rtu.lv/rtu/vaaApp/sprpub – screenshots of the interface are attached in "Screenshots of RTU IT systems"), drawing up learning agreements and enrolment of students in study programmes, Register of Study Courses (its public part is available at https://stud.rtu.lv/rtu/discpub/list – screenshots of the interface are attached in "Screenshots of RTU IT systems"), designing student's individual study plans, drawing up orders, implementing study courses and study process, registering grades, recognizing study courses, awarding qualifications, administering payments, hostel information, gathering information to issue diploma supplements, etc. This system is one of the main cornerstones in the administration of RTU study process.

To ensure effective implementation of the study process, Moodle e-learning system is used, where all relevant information is compiled in an automated way (study courses, users, groups, access rights, etc.). This system ensures student-instructor communication. The academic staff members place various electronic materials, assessment tests, homework assignments, information on a particular study course, etc. in the system. Students can also view their financial information on the ORTUS portal, as well as make request for documents (references, transcripts of records, copies of a learning agreement, etc.). For online distance learning RTU academic staff has options to use *Zoom* or *Microsoft Teams* video conferencing platforms.

Since 2007, more than 130,000 unique study course sites have been generated in the e-learning environment of RTU. Students can access electronic learning resources anytime and anywhere.

Digitization of classrooms and schedules has been carried out to ensure efficient premises management and study planning (https://telpas.rtu.lv (in Latvian); https://nodarbibas.rtu.lv/ – screenshots of the interface are attached in "Screenshots of RTU IT systems"). Each RTU student and academic staff member can access their schedule, which provides information on the venue, time, instructor, room, title and type of lecture. In addition, for user's convenience purposes, the system greatly facilitates lecture planning and scheduling, as well as optimizes the use and efficiency of premises.

Electronic Staff Management and Record-keeping Systems, which cover the circulation of record-keeping and personnel documents at RTU (https://docs.rtu.lv/ – screenshots of the interface are attached in "Screenshots of RTU IT systems"), are also used to ensure the efficient administrative work. Electronic document coordination and document e-signing functionality have been introduced, thus reducing print-based document circulation and significantly increasing document circulation speed. Since the autumn semester 2019, students have been provided with electronically signed learning agreements. Since 2016, RTU graduates have been receiving electronically signed transcripts of records.

In terms of quality assurance, a digital student survey system is used, with the help of which the quality control of study courses and study programmes is implemented each semester. Based on the results of quality control, regular measures are taken to improve study programmes and the study process, in general.

For the additional convenience of RTU students, academic and general staff members, RTU leases Microsoft Windows and Microsoft Office software, which provides all IT users with access to the latest Microsoft software. RTU students can use the licensed Windows operating system and the Microsoft Office productivity suite provided by RTU for study needs. All IT users have access to Microsoft Office 365 cloud computing platform with one terabyte of storage space available to each user and access to a variety of additional collaboration and productivity tools (Microsoft Teams, SharePoint Online, Forms, OneNote, OneDrive, Outlook, etc.). RTU students, academic and general staff have access to the University's email system.

To support research activities, RTU has developed the Centralized Research Support System, which records all information on publications, patents, commercialization applications, Doctoral Theses, RTU scientific journals, research staff, etc. The system provides access to information according to Open Access principle (https://science.rtu.lv – screenshots of the interface are attached in "Screenshots of RTU IT systems"). RTU students and academic staff also have centralized access to research software.

RTU has high-speed fibre optic Internet and extensive wireless network infrastructure with over 400 access points, including the international *Eduroam* service. In addition, desk phones and mobile communications are provided for fast and easy communication.

To ensure a stable and secure operation of the information technology infrastructure, continuous monitoring of the IT infrastructure and systems is performed, resulting in proactive incident control. Data backup is also ensured.

The Information Systems Security Policy has been developed and implemented with the primary goal of ensuring the secure use of RTU information systems by establishing and maintaining a sufficient set of measures to reduce or prevent potential or resulting harm. Implementation of the Information Systems Security Policy envisages security checks, data transmission network monitoring, as well as preventive measures. Regular IT security and personal data protection training is organized for IT users. Automated security incident management and risk management have been implemented. Statistics demonstrate that the number of IT security incidents dropped significantly over the last five years.

The IT User Support Centre provides IT user support, by applying a one-stop approach to process applications based on ITIL guidelines. Since 2007, the IT User Support Centre has processed and resolved more than 160,000 IT user applications.

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 direction 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 direction, 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 options for the subscription to the databases.

A library plays an important role in the provision of methodological guides and educational resources to students. The RTU Scientific Library (SL) (https://www.rtu.lv/en/studies/scientific-library) is a library of national importance, which has acquired its status in the process of library accreditation. The SL provides the necessary information to ensure RTU study process and research activities, as well as provides a library, bibliographic and information services to RTU students, academic and general staff. The Library holds more than 1.3 million printed documents and e-resources in RTU industry specific databases. The Library stock is located at the Central Library, the Study Material Subscription, the Chemistry Branch, the Transport Branch and Study and Research Centres in Daugavpils, Liepāja, Cēsis and Ventspils.

In 2016, significant investments were made in the development of the SL infrastructure by building additional premises (2240 m^2). The total area of the SL premises is 6393 m^2, of which 3417 m^2 are reader service premises. There are 713 working places for SL users. The SL has four group rooms and six individual booths, a rare book reading room and a conference room. The library is equipped with self-service facilities. The SL is accessible for users with disabilities.

In order to improve the SL activities and to meet the information needs of academic and research staff, the Library Council has been established, which decides on replenishing the library collection with printed publications and subscribing to the necessary databases. The Library Council has approved the Compilation Policy of RTU SL Collection, which sets the basic principles of the collection development in accordance with the areas of RTU academic and research activities.

After the SL receives its funding from RTU, it calculates funding for the information resources for each study programme. The collection is replenished taking into account the recommendations of the heads of the study programme and researchers, in compliance with the allocated funding. By contacting the SL Collection Development Department regarding replenishment of collection, the desired editions can be ordered at the Library website by filling out an order form, an application form, contacting by phone 67089353, or visiting the Library at Paula Valdena iela 5-105. The SL offers a guide, which includes websites of various Latvian and foreign publishing houses and bookstores for searching publications and e-resources.

Database subscription agreements are concluded both directly with the supplier and through the Cultural Information Systems Centre, which is the Latvian national representative for the international non-profit organization Electronic Information for Libraries (EIFL https://www.eifl.net/). The EIFL Licensing Programme offers libraries of state importance to subscribe to internationally recognized databases at a significantly reduced subscription fee that is not offered to individual subscribers, thus saving the financial resources of libraries.

At the request of the academic staff of the study field “Manufacturing and processing”, 91 new books were purchased by the SL amounting to 6932.28 EUR in the period of 2013 – 2020.

Study programmes of the study field “Manufacturing and Processing” are implemented at the 6th, 7th, and 8th LQF / EQF levels in two specialization fields - “Clothing and Textile Technology” and “Material Technology and Design”.

At the request of the academic staff of the specialization field “Clothing and Textile Technology”, 42 new books were purchased by the SL amounting to 3956.42 EUR in the period of 2013 - 2020.

At the request of the academic staff of the specialization field “Material technology and Design”, 49 new books were purchased by the SL amounting to 2975.86 EUR in the period of 2013 - 2020.

Every month, the list of the newly-received literature is published in the SL newly-received literature bulletin (https://www.rtu.lv/lv/studijas/biblioteka/jaunieguvumi, in Latvian).

Subscribed databases

(https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes, in Latvian):

- ProQuest Ebook Central, Academic Search Complete EBSCOhost, Applied Science & Technology Source EBSCOhost, Business Source Ultimate EBSCOhost, EBSCOhost eBook Academic Collection, Wiley Online Library, SpringerLink, The International Monetary Fund.
- The SL also has access to databases funded by the Ministry of Education and Science: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- LETA, Letonika, the database of Latvian standards (available only on library premises).

E-resources specific for the study direction “Manufacturing and Processing”:

- **E-book libraries**

EBSCOhost Ebook Academic Collection

Proquest Ebook Central (Collections: Science&Technology; Business)

SpringerLink (Collections: Engineering; Chemistry; Materials Science)

- **Databases of scientific articles**

ScienceDirect

EBSCOhost Academic Search Complete

EBSCOhost Applied Science & Technology Source

Wiley Online Library

IEEE Xplore Digital Library

The use of RTU SL databases has been growing since 2016. The number of downloaded full texts in 2019 – 325,234.

The SL new premises have made it possible to expand the range of services available to users. Since the opening of the new premises, the number of library visits increased from 103,825 to 691,200. The SL Central Library is open to users from Monday to Saturday (https://www.rtu.lv/lv/studijas/biblioteka/darba-laiki-un-kontakti, in Latvian). There is an all-day reading room. At the request of students, during the session in December 2019 and January 2020, five central Library floors with a collection were available to users around the clock. During the summer the Central Library is open every working day.

The SL information sources are open access resources. Books and periodicals relevant for the study direction “Manufacturing and Processing” are located in the main building of the SL (Paula Valdena iela 5) and in the Chemistry branch (Paula Valdena iela 5-465) in compliance with UDC indexes. The basic indexes for this study direction are:

677 - Textile industry. Textile fibers.

677.1/2 - Plants fibers

677.4 - Chemical and artificial fibers.

687 -Clothing industry. Manufacture of wearing production.

74 - Drawing. Design. Applied arts and crafts,

745/749 - Industrial arts and crafts. Applied art.

674, 684, 749.1.

The last copy of the oldest editions that comply with RTU profile is stored in the SL repository. They are always available to users.

The on-duty librarian helps find the necessary resources. More detailed information and consultations are provided by bibliographers (information specialists). The SL has librarians responsible for particular fields of science.

Searching for SL resources is ensured by the PRIMO Discovery search tool. It allows searching for the information in the library catalogue, subscribed databases, as well as in databases created by

the SL. One can simultaneously obtain information about the available resources in 12 libraries in Latvia.

Both the electronic catalogue and RTU portal ORTUS can be used to reserve the library resources remotely. Remote access to databases is also provided. Since the introduction of RFID technology, users have been able to use five book-dispensing self-service vending machines and return books to a book-sorting vending machine around the clock.

The SL provides students, academic staff and other interested parties with different types of individual consultations and group training in information literacy.

Editions that are not available in the SL are delivered through an interlibrary subscription or international subscription. Internet access is provided throughout the SL. The SL provides copying, scanning, printing and binding services, as well as there is a self-service canteen.

Contact information for SL users in English is published at https://www.rtu.lv/en/studies/scientific-library.

Since 2020, IDT has access to the database “Latvijas standarts” ("Latvian Standard") through RTU SL.

3.4. 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.

The implementation of RTU personnel policy is stipulated in the Human Resources Development Plan, which focuses on three main goals within the professional development of the academic staff: renewal of the academic staff, by promoting academic work of Doctoral students, improvement of the professional competence of the existing academic staff and attraction of foreign academic staff. The action plan sets out, for each goal, the activities and sub-activities to be carried out, defines the results to be achieved, the responsible organizational units and the implementation schedule.

Elections of RTU academic staff are held in accordance with the requirements of the Law on Higher Education Institutions and Cabinet regulations based on the recommendations of the Council of Higher Education, in accordance with the Constitution of RTU and the regulations approved by the Senate “On the Procedure of Electing Professors and Associate Professors” and “On the Procedure of Electing Assistant Professors, Lecturers and Assistants” (publicly available at https://www.rtu.lv/lv/universitate/vakances-rtu/personalatlases-dokumenti, (in Latvian); (in Latvian); the English translation is in the file of Appendix 42 and 43 of the List of the governing regulatory enactments and regulations of the higher education institution/ college), as well as in compliance with other internal laws and regulations.

At the proposal of organizational units, the faculty council or the institute board shall consider and approve a reasoned proposal made by the head of a respective organizational unit for an announcement of the competition for vacant academic positions, which expire in the respective academic year. The faculty council or the institute board shall submit the proposal under consideration to the RTU Personnel Department together with the job description and qualification requirements, including the workload (full-time or part-time).

Regarding academic positions for professors and associate professors, where the term of election expires in the respective academic year, periodic evaluation of scientific and pedagogical

qualifications is performed in accordance with the procedure for "On periodic evaluation of professors and associate professors" approved by the RTU Senate meeting on 29 June 2020 (published at https://www.rtu.lv/writable/public_files/RTU_par_profesoru_un_asocieto_profesoru_periodisko_novertesanu_apstiprinasanu.pdf (in Latvian); the English translation is in the file of Appendix 45 of the List of the governing regulatory enactments and regulations of the higher education institution/ college).

The Personnel Department informs the head of the structural unit of the professor or associate professor about the need to organize the evaluation of the professor or associate professor. The evaluation is performed by the Board of professors of the field in accordance with the Law on Higher Education Institutions, the Regulations of Councils of RTU professors and the Regulations on periodic evaluation of professors and associate professors approved by the RTU Senate. After the evaluation, the Council of the professors of the field submits an opinion on the result of the evaluation to the Rector and the Personnel Department. Taking into account the evaluation of the Board and the procedures and criteria set by the higher education institution, the employment contract with the associate professor or professor may be extended for a definite or indefinite term. If, as a result of the evaluation, the scientific and pedagogical qualification of a professor or associate professor meets the evaluation criteria set by the higher education institution, the employment relationship is continued. If, as a result of the evaluation, the qualification of a professor or associate professor does not meet the evaluation criteria set by the higher education institution:

- the relevant employment contract of the professor or associate professor is terminated;
- the department may decide to announce a new vacancy.

The Personnel Department announces a competition for academic staff positions at RTU website, the *Euraxess* vacancy portal and at least in one mass medium distributed throughout Latvia. The applicant shall personally submit or send by email the signed application documents no later than one month after the date of the competition announcement.

The employment relationship shall be established by means of a written employment agreement between the Employer and the Employee at least two working days before the commencement of employment. The employment agreement shall be drawn up in duplicate. One copy shall be kept by the Personnel Department of the Department of Personnel and Working Environment (in accordance with RTU File Nomenclature) and the other shall be issued to the Employee. Prior to entering into the employment agreement, the applicant is acquainted with RTU Rules of Procedure.

Employee's duties are defined in accordance with the Classification of Occupations of the Republic of Latvia and RTU Position Catalogue, Unified Work Remuneration Procedure at RTU (https://www.rtu.lv/lv/universitate/skaitli-un-fakti/vienota-darba-samaksas-kartiba, in Latvian; the English translation is in the file of Appendix 44 of the List of the governing regulatory enactments and regulations of the higher education institution/ college), RTU Rules of Procedure and the requirements laid down in the job description, which is an integral part of the employment agreement. A job description shall be presented to and signed by the Employee. A job description shall be drawn up in duplicate; one copy shall be issued to the Employee and the other shall be kept according to RTU Case Nomenclature.

Before taking up the employment, the Applicant shall present an identity document – passport or identity card, the Foreigner shall additionally present a visa or residence permit, as well as a work permit if such a permit is required in accordance with regulatory enactments.

Visiting academic staff shall be employed in compliance with:

- Law on Higher Education Institutions (https://likumi.lv/doc.php?id=37967, in Latvian);
- Labour Law (https://likumi.lv/ta/id/26019-darba-likums, in Latvian);
- Immigration Law (https://likumi.lv/ta/id/68522-imigracijas-likums, in Latvian);
- Cabinet Regulations No 568 "Regulations Regarding the Procedure by which a Research Institution Concludes and Terminates Employment Agreements with a Foreign Researcher" as of 21 July 2008 (https://likumi.lv/doc.php?id=178749, in Latvian);
- Cabinet Regulations No 225 "Regulations Regarding the Amount of Financial Means Necessary for a Foreigner and the Determination of the Existence of Financial Means" as of 25 April 2017 (https://likumi.lv/doc.php?id=290808, in Latvian);
- Cabinet Regulations No. 25 "Implementing Regulations for the First, Second and Third Project Applications Selection Round of Specific Objective 8.2.2 "To Strengthen Academic Staff of Higher Education Institutions in the Areas of Strategic Specialization" of the Operational Programme "Growth and Employment"" as of 9 January 2018 (https://likumi.lv/doc.php?id=296513, in Latvian);
- RTU internal regulations “Procedure of Involvement and Employment of Visiting Academic Personnel at RTU” as of 26 November 2018 (see the file of Annex 25 of the list of Internal regulations);
- RTU internal regulations "Unified Work Remuneration Procedure at RTU" as of 27 April 2020 (amendments on 28 September 2020, 21 December 2020, 25 January 2021) (the English translation is in the file of Appendix 44 of the List of the governing regulatory enactments and regulations of the higher education institution/ college).

According to the results of the applicant selection competition, the employment agreement with the visiting academic staff is signed within a month, specifying an hourly rate. A job description is also provided, which includes specific job responsibilities (delivering lectures, designing study courses, lecture cycles, supervising study papers, etc.). The workload of the visiting academic staff member may include the provision of face-to-face work (delivering lectures, providing tutorials, conducting seminars, supervising graduation papers, etc.) and remote work if it complements the face-to-face work (video lectures, tutorials, supervision of graduation papers). If the work is to be carried out remotely, face-to-face visits (e.g., tutorials) should be provided at the organizational unit.

The visiting academic staff member shall enter into the employment agreement in compliance with the requirements of the Latvian regulatory enactments. During the term of the employment agreement, all assignable copyrights for the work created by the visiting academic staff member, including curricula, materials, and any other teaching aids developed by the visiting academic staff member, shall pass to the Employer. The visiting academic staff member, upon termination of the employment agreement, shall be obliged to transfer the work created within the framework of the employment agreement, including study materials, to RTU. Before terminating the employment agreement, the visiting academic staff member shall submit to the head of a respective organizational unit the reports and other documents stipulated in the employment agreement.

3.5. 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 qualification (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.

At the end of 2018, the Centre for Academic Excellence (teaching and learning centre) was established at RTU in order to support RTU academic staff (in the areas of pedagogical, intercultural communication and self-development). The main tasks of the Centre for Academic Excellence are as follows:

- to organize various educational events, such as seminars, thematic series of events, guest lectures, conferences, discussions with the participation of the Latvian and foreign specialists;
- to coordinate experience exchange activities within faculties and other organizational units;
- to inform (including posting to ORTUS) the academic staff about the latest teaching and learning trends that are appropriate for RTU;
- to provide guidance to academic staff on the use of teaching and learning methods, as well as on the assessment of students' knowledge, skills and competence;
- to inform students about learning opportunities, such as platforms, systems, applications, effective methods and forms of learning that can be used both in the study process and individually.

Each semester, a core set of activities is offered taking into account the professional competence and needs of the academic staff, which are identified through a survey, in which the lecturers indicate the most important topics and areas in which they want to improve themselves. Student surveys data and information from student self-governments are also evaluated, to gain some topics which should be improved for lecturers from students' point of view. At the same time, proactive actions are being taken to assess the potential needs of academic staff.

The Centre for Academic Excellence organizes two methodological conferences a year. The conference organized in the autumn semester is dedicated to the modern content of the study courses, while the conference held in spring focuses on modern teaching and learning methods. Materials of all events are available on ORTUS within the study course "Materials of the Centre for Academic Excellence".

After each professional development event, participants complete assessment questionnaires, which enable organizers to improve the range of offered events. In order to promote the development of competences of the academic staff, the student surveys are analysed each semester, as well as discussions with the representatives of faculties, student self-governments and the instructors themselves take place.

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

With the emergency situation and lecturing switching to the remote mode, the CAE on the ORTUS portal prepared a site “Support in the provision of remote courses”. The site consists of six sections: General Information, Technical Assistance, Pedagogical Assistance, Experience Stories, Distance Exams and Mutual Support. Each section is regularly updated with relevant resources. Lecturers appreciate such a resource and also suggest what other materials should be included.

Since March 2020, almost 80 webinars have taken place (both organized by CAE and international partners, in which RTU lecturers were invited to participate). Webinars organized by the CAE were recorded, with more than 400 participants participating online, and the recordings were viewed more than 650 times.

Educational events are also organized by the Career Support and Services Unit, providing regular

seminars to RTU academic and general staff on the following issues:

- cultural diversity;
- work productivity (time planning, conflict resolution, communication culture, stress management etc.);
- critical thinking;
- how to approach students with disabilities.

For participation in seminars, employees receive professional development certificates issued by RTU Department of Further Education.

The themes of seminars and classes are offered taking into account the results of RTU staff surveys, as well as current trends at foreign universities. Information on seminars organized over the years is available here (full Information available only in Latvian).

RTU IT User Support Centre regularly organizes training on IT systems and the latest technology tools for RTU academic and general staff. Training is organized on the following topics:

- e-learning environment (Moodle) for beginners;
- e-learning environment (Moodle) for advanced users;
- MS Outlook email and calendar;
- Office365 Teams and OneDrive;
- searching in subscribed databases;
- record-keeping systems;
- basic IT security issues working with RTU information systems.

In January each year, the Student Parliament of RTU organizes the contest “Annual Award of the Student Parliament of Riga Technical University”. During the event, faculty academic staff members chosen by the students are awarded the honorary titles “Most Active Instructor of the Year” and “Instructor of the Year”.

To recognize and appreciate RTU academic staff, since 2018, RTU has been organizing contests “Annual Academic Excellence Awards” and “Young Academic Staff Member of the Year” in cooperation with the foundation “Riga Technical University Development Fund” and Industry Service Partner Ltd. The aim of these events is not only to award the best academic staff members but also to promote creativity in the academic environment.

The academic staff involved in the implementation of the study field “Manufacture and Processing” actively use the possibilities for professional improvement. 73% of the academic staff involved in the implementation of the study field have attended a total of 472 various courses, seminars and lectures and have used internship opportunities abroad. 57% (270) of all the improvement events attended by the academic staff have been events organised by RTU. The academic staff has had an opportunity to regularly attend methodological conferences, seminars related to the improvement of pedagogic and psychological skills, several seminars have been related to the improvement of digital skills, data analysis, labour and labour environment safety, environmental matters and renewable energy, design, economics and finance, administration of the projects of the EU funds, improvement of scientific skills, preparation of science projects and publications, and many other improvement events.

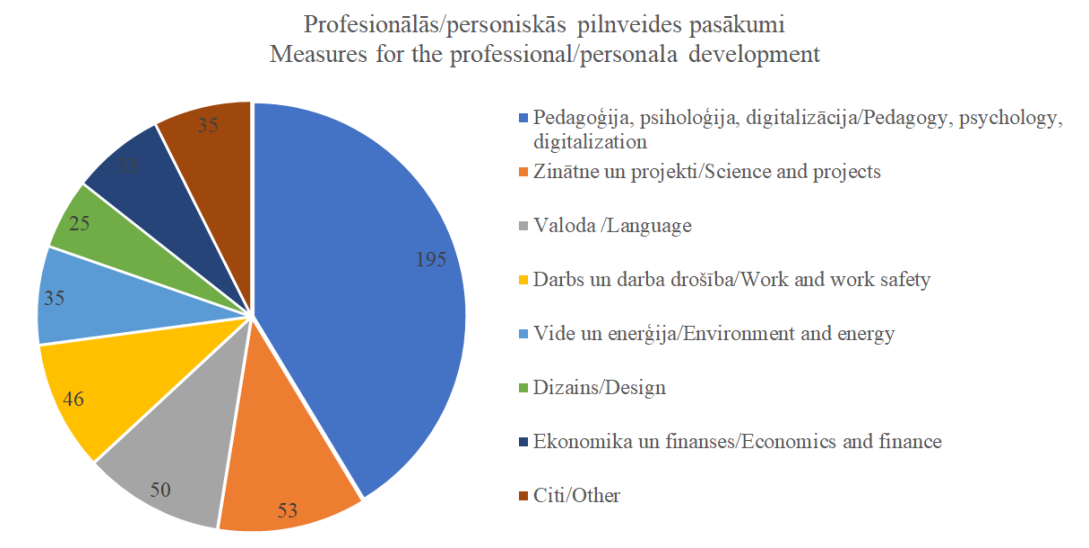


Figure 3.4. Professional and personal development

The academic staff has been particularly active in studying English, which is related to the possibility provided by RTU to learn English within SAM project (Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas", 8.2.2.0/18/A/017) at RBS. Several members of the academic staff have completed multiple courses of English, thus considerably improving their knowledge level. A relevant level of knowledge of English allows the academic staff to get involved in the work with foreign students, which is of particular importance within the context of the newly established study program “Design Engineering”.

Within the above referred project, the academic staff has also had an opportunity to have an internship in the industry undertakings (e.g. SRC Brasa, Fristads Kansas Production, Silvanols, MEKA, Instro, etc.), by acquiring new professional knowledge, skills and competences, learning new technologies. The benefit has been mutual, as also undertakings obtained new experience and knowledge by cooperating with the academic staff of higher education institutions. All the academic staff members have introduced the knowledge acquired during the internship in the study courses conducted by them.

The added value of the opportunities used by the teaching staff is updated in the election process, assessing the achievements of the teaching staff over a period of 6 years. The decision of the RTU Senate stipulates that in the 6-year period the lecturer must improve himself in the amount of at least 160 hours. It is also an incentive for teachers to attend different types of courses and engage in activities.

Also, a student survey is conducted every year, where students have the opportunity to evaluate the performance of the teaching staff. Thus, IDT lecturer Gunta Zommere received the RTU Student Parliament Annual Award in the nomination “The Most Inspiring Teacher of the Year 2013”, but Inga Zotova received the RTU Student Parliament Annual Award in the nomination “Student Support of the Year 2020”.

3.6. Provide information on the number of the teaching staff members involved in the implementation of the relevant study programmes of the study direction, as well as the analysis and assessment of the academic and research workload. Provide the assessment of the incoming and outgoing mobility of the teaching staff over the reporting period, the mobility dynamics, and the issues which the higher education institution/ college must tackle with regard to the mobility of the teaching staff.

75 academic staff members are involved in the implementation of the study field “Manufacture and Processing”. A majority of them, i.e. 71 (95%) are elected to academic positions at RTU. Industry representatives are involved in the implementation of individual study courses.

In compliance with the Law on Higher Education Institutions, a minimum of 65% of the academic staff holding a Ph.D. degree should be involved in the implementation of professional study programs. The qualification of the academic staff of the study field “Manufacture and Processing” complies with the Law on Higher Education Institutions. 51 (68%) members of the academic staff hold the Ph.D. degree and 24 (32%) members of the academic staff hold the Master's degree. More information about the qualification of the academic staff is available in the Annex “Biography of teaching staff”.

The academic staff of other RTU structural units participates in the implementation of the study direction, providing exact and humanities study courses, like mathematics, physics, pedagogy, psychology, languages, etc.

The qualification of the academic staff involved in the implementation of the study field complies with the specifics of the study programs, in particular, the academic staff members have Ph.D. degrees in the branches of engineering sciences, materials sciences, the sub-branches of the textile and clothing technologies and wood materials and technologies. Also, academic staff holding Ph.D. degrees in other engineering sciences, natural sciences and social sciences are involved in the implementation of the study program.

The study field “Manufacture and Processing” is implemented by 18 (24%) professors, 16 (21%) associated professors (Figure 3.5.). These members of the academic staff are mainly responsible for the preparation of study courses, their improvement and compliant implementation, supervision of the Master and Ph.D. thesis. Also, 23 (31%) of assistant professors and practical assistant professors (Section 39 of the Law on Higher Education Institutions), 10 (13%) lecturers and 4 (5%) assistants participate in the implementation of the study field. All the professors and associated professors hold a Ph.D. degree. Also, 14 assistant professors and practical assistant professors hold Ph.D. degrees.

Implementation of some study courses is also provided by the research personnel involved in the study process, totally 4 persons. 2 of them are leading researchers, 1 is a researcher and 1 is a research assistant. A large part of the academic staff elected to academic positions has also been elected to science positions. 38 out of 52 academic staff members have also been elected to the position of a researcher or a leading researcher.

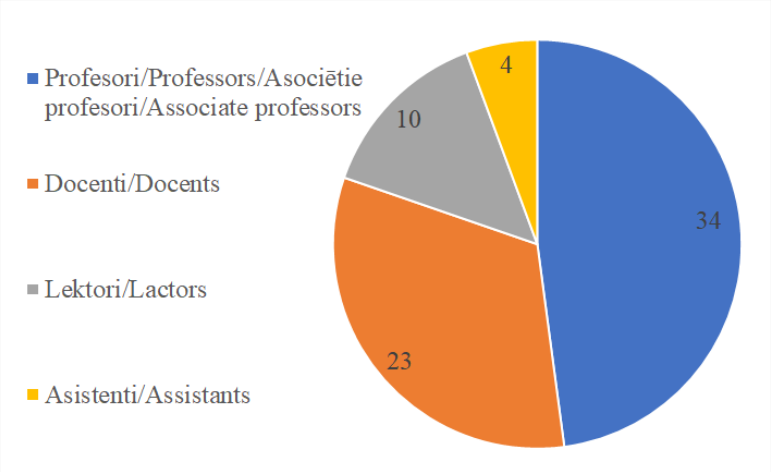


Figure 3.5. Positions of the academic staff

The academic work of the academic staff of the study field “Manufacture and Processing” involves delivering lectures and supervision of laboratory/ practical assignments, supervision of study projects, development of the content of study courses, supervision and review of study and graduation papers, participation in the interim demonstrations of study papers and examination commissions of the study graduation papers. The academic staff regularly improve their qualification by participating in methodological conferences and attending various courses.

The academic staff is also involved in the research work, they prepare project applications, implement projects, prepare publications, prepare and execute contracted scientific projects in cooperation with businesses, supervise Ph.D. thesis, review Ph.D. thesis and publications, participate in organisation and scientific commissions of international journals, attend scientific conferences and seminars both as attendees and as participants, participate in the defence of a Ph.D. thesis.

All the academic staff members of IDT holding the Ph.D. degree are involved in the administrative work in the Council of IDT. Some academic staff members also work in other councils, the RTU trade union, the RTU Senate. The administrative work involves also the management of the study direction, management of study programs and management of structural units.

At the beginning of every academic year, the envisaged load of the academic staff members for the next academic year is assessed, by taking into account also involvement in the administrative, academic and research work, and adjustments are made according to the load of the preceding period, as necessary.

The load of the academic personnel is overlapping in most cases, and it is not possible to define a strict borderline between the academic and research load, as all the elected academic staff members are engaged in both academic, research and also administrative work in some cases. A load of every individual academic staff member is defined by taking into account the position, involvement in projects and contracted projects, involvement in administrative work, as well as personal competences and experience.

The academic staff of IDT uses both Erasmus+ mobility possibilities, as well as the opportunities offered by various scientific and study projects, like ESF, ERDF, Erasmus+, Nordplus, etc.

There were 99 outgoing mobilities in the reporting period (in IDT alone). Their number fluctuates by years, still, there is an increasing trend. The mobility of the academic staff is affected by various factors. The process is related to applying for the mobility, preparation and approval of documents, as well as the daily study, research and administrative work of the academic staff and the possibility to find time for the mobility. The highest number of outgoing mobility in the reporting period was in the academic year 2018/2019 when the total number reached 31 mobility. There was a sharp decrease in mobilities in the academic year 2019/2020 and this is related to the pandemic (figure 3.6).

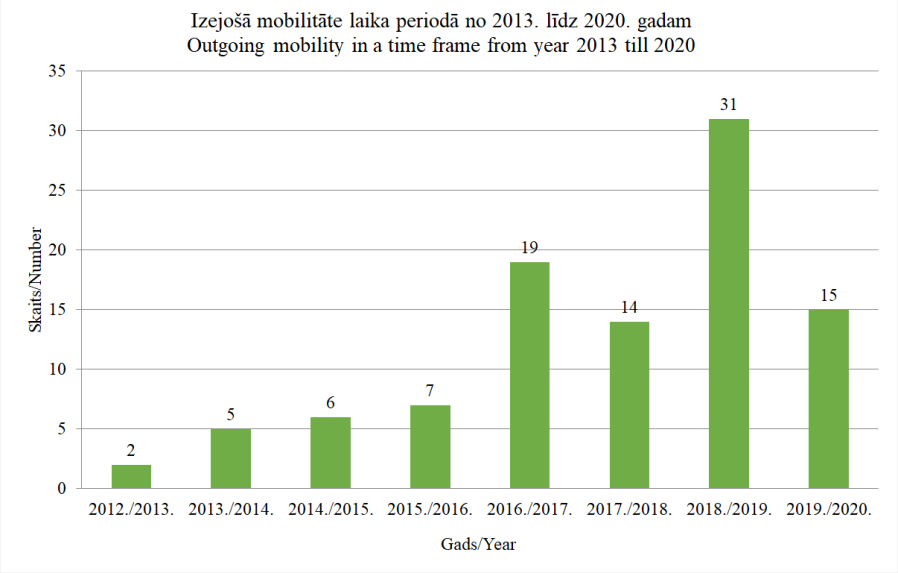


Figure 3.6. Outgoing mobilities of academic staff

Mobilities involve delivering guest lectures, performing of research and also gaining experience in foreign higher education institutions, research institutes and undertakings. The academic staff has also attended conferences, seminars, project meetings and exhibitions. During the reporting period, there have also been mobilities within the PostDoc project for the performance of research in a foreign research institution (Figure 3.7.).

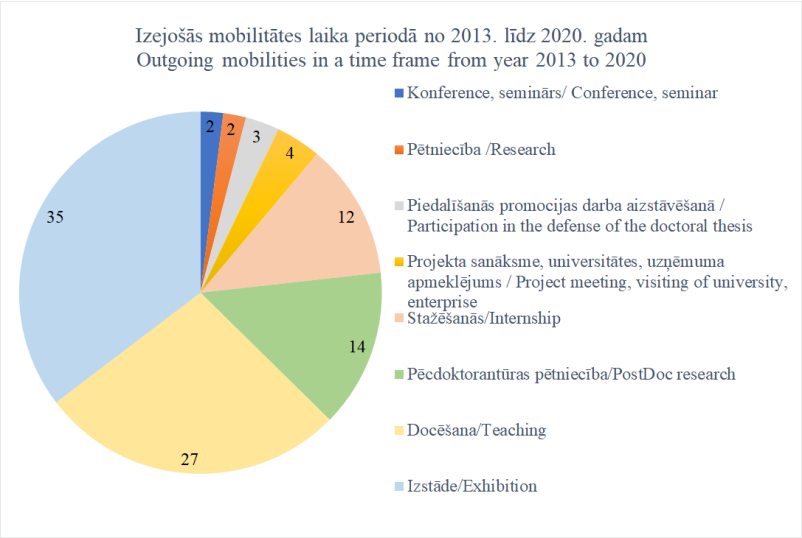


Figure 3.7. Outgoing mobility

According to the statistics data, the academic staff members have most often visited Germany (18 instances), followed by Lithuania (14), Estonia (9) and Portugal (8). The country of mobility is determined by the location of the home country of project partners, research institutes, universities and undertakings (Figure 3.8.).

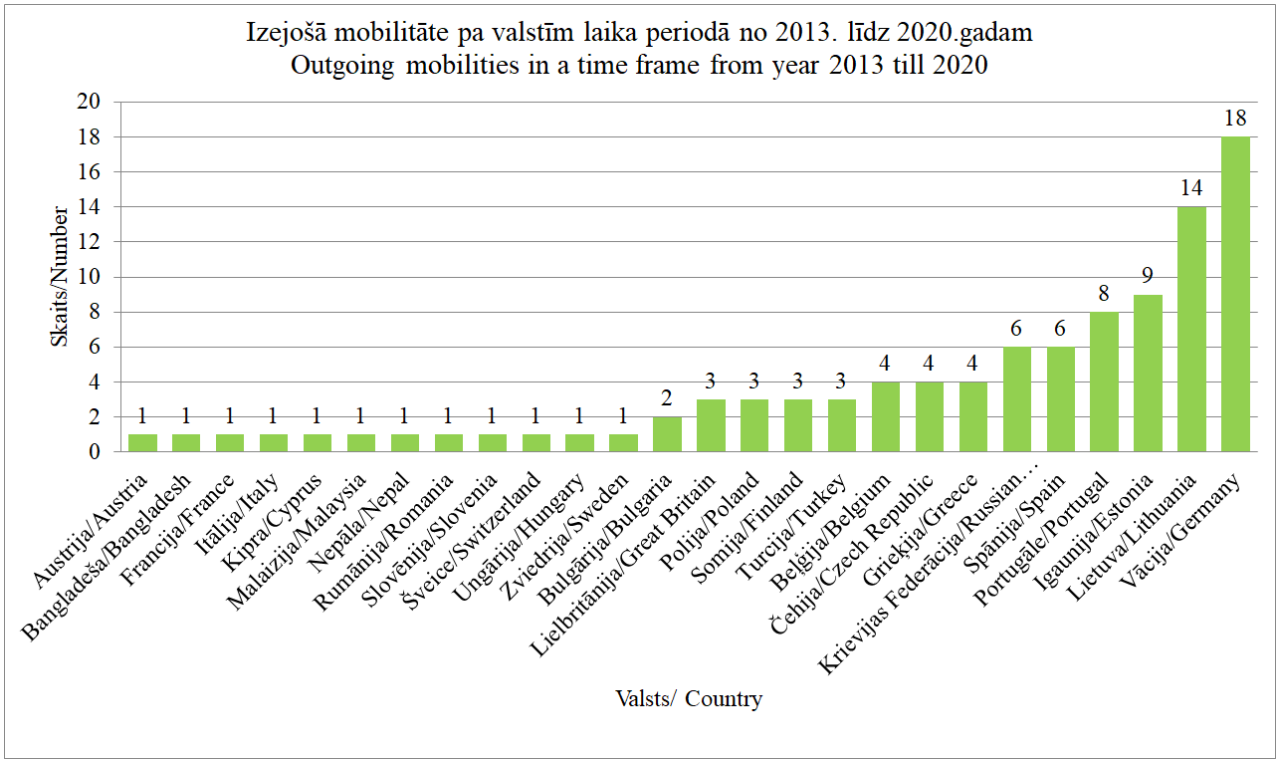


Figure 3.8. Outgoing mobility by countries

IDT has long-term and diverse cooperation with several higher education institutions and research institutes. During the reporting period from 2013 to 2020, a range of academic staff from various countries has visited IDT. Various support programs, like Erasmus+, Nordplus, and the opportunities in other scientific and study projects are used for the attraction of guest academic staff. During the reporting period there has been regular methodological and scientific cooperation, mutual exchange of experts, exchange of guest lectures and joint problem solving.

Guest academic staff is regularly involved in the study direction, thus ensuring sharing of knowledge and experience. In the academic year 2018/2019, RTU started a project funded by the ESF, within which it was possible to involve three guest academic staff members from IDT partner universities (Kaunas University of Technology, Vilnius University of Applied Sciences and Minho University), who supported the study process of IDT for six months each by conducting study courses within the study programs. One of these academic staff members was employed for additional six months, thus ensuring sustainability. There were most incoming mobilities in the academic year 2016/2017 (13), and the least mobilities in the academic year 2017/2018 (3), in the academic year 2018/2019 there was an increase in the number of mobilities (11) (Figure 3.9.)

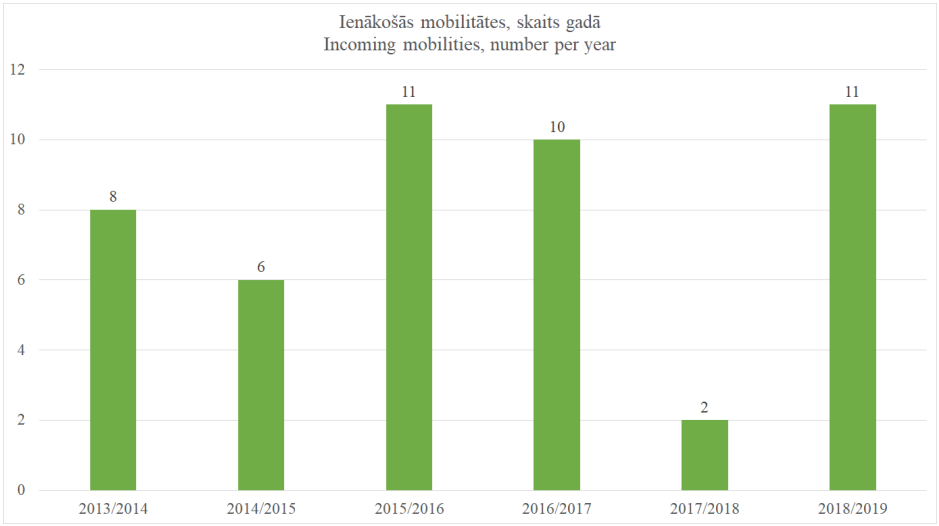


Figure 3.9. Incoming mobilities in the study field “Manufacture and Processing”

In the reporting period from 2013 to 2019, there were 48 incoming mobilities from ten countries in the study field “Manufacture and Processing”. The highest number of mobilities were from Lithuania, a total of 21, followed by mobilities from Russia (6), Romania (4) and Germany (4). Repetition of mobilities is logical, as close cooperation has developed with many universities in the area of both studies and science. IDT has very good cooperation with Kaunas University of Technology, Vilnius University of Applied Sciences, Romanian Georghe Asachi Tehinko University, Russian Southern Federal University, as well as Tallinn University of Applied Sciences and others (Figure 3.10.).

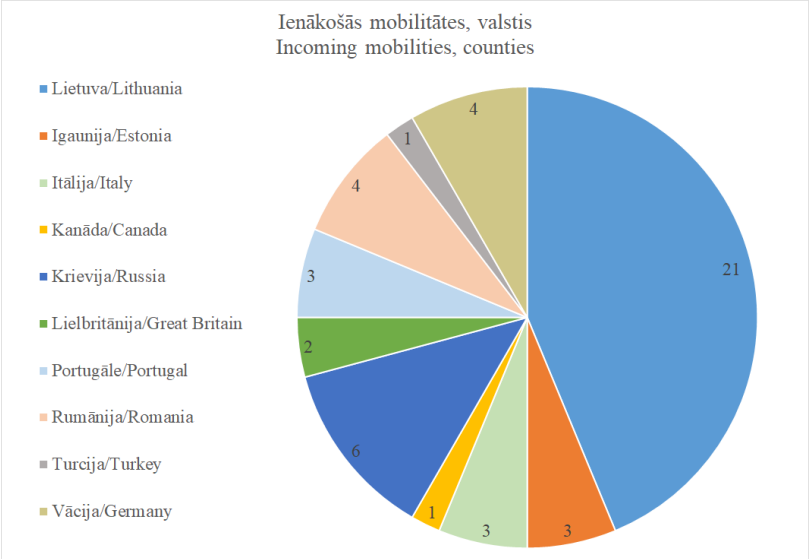


Figure 3.10. Incoming mobility by countries

3.7. 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.).

RTU Career Support and Services Department provides students with a wide range of career and psychological support services.

Career development support involves:

For prospective students:

- consultation on study programme selection;
- consultation on study selection and skills profiling;
- career choice seminars within RTU Open Days and upon request.

For current students:

- regular seminars and individual consultations on the development of career management skills, writing CVs and cover letters, job interview process;
- seminars on the development of entrepreneurial skills;
- project "RTU Golden Fund" to honour the best graduates and to promote new opportunities in the labour market;

- student summer camps for the development of career management and social skills and competences;
- online resource https://ekarjera.rtu.lv/ (in Latvian);
- an annual career day aimed at informing students majoring in engineering, natural and social sciences about the best and leading companies in the respective fields and bringing them closer to potential partner companies for undertaking internship and employers.

Psychological support involves:

- individual consultations and support in case of difficulties with studies (time planning, lack of motivation, social anxiety, adaptation difficulties) and individual psychologist consultations on personal issues and difficulties (including crisis intervention).

Seminars and workshops on the following topics:

- adaptation events for first-year students - informative classes within the study course "Introduction to Study Field", seminars on the development of learning and communication skills;
- stress management methods;
- time planning methods;
- self-motivation;
- emotion management and development of emotional intelligence;
- public speaking skills.

Support is differentiated by the target groups (https://www.rtu.lv/en/studentservice/career-centre/psychological-support):

- prospective students (secondary school pupils, vocational school graduates, other prospective students): consultations concerning the studies are available, including skills diagnostics.
- first-year students: informative classes within the framework of the study course "Introduction to Study Field"; seminars on the development of learning skills; information letters on career and psychologist support opportunities; individual career and psychologist consultations; and other activities in cooperation with businesses and non-governmental organizations.
- all RTU students: individual career and psychologist consultations, seminars and classes, guest lectures, RTU Career Day.
- foreign students (Erasmus+ mobility and full-time): individual and career support consultations are available in English; wherever possible, seminars and classes are conducted in English, such as seminars on writing CVs and cover letters, time management.
- students with special needs: psychological and career support consultations are provided upon request; physical access to the room; opportunity to come with one's mentor or interpreter.
- graduates: career support consultations are provided if necessary; consultations on writing CVs and cover letters, job interview process, career opportunities.
- staff: consultations on work and study-related issues are provided to RTU academic and general staff members, if necessary.

As a result of the pandemic, the offer has become even more accessible, as counselling and also career classes can be offered remotely.

In 2014, the Student Services Centre was opened in Ķīpsala campus. It provides day-to-day support under the supervision of the Career Support and Services Department:

- provides answers to various questions that students may have;
- provides printing, copying and binding services;
- issues identification cards;
- draws up references and transcripts, if necessary.

Further information is available at https://www.rtu.lv/en/studentservice/student-service.

In 2019, work was started on strengthening support for students with disabilities and in 2020 guidelines were issued with recommendations for effective communication and improvement of the study environment for people with disabilities and special needs.

RTU International Cooperation and Foreign Students Department has academic consultants who consult foreign students on studies and practical issues. Academic consultants keep track of the students' academic performance and attendance, as well as meet students on a regular basis to make sure their studies are successful, both in and outside the classroom. Shortly after the arrival of students, academic seminars are held, which are compulsory for all new students. Academic seminars are held approximately twice a week at the beginning of each semester, in line with the student influx. During these seminars, academic consultants introduce students to RTU internal rules, their responsibilities and rights, academic integrity, and various other practical aspects. In the future, it is planned to divide the students into groups according to the study programmes and to involve the heads of the study programme in the seminars so that the students would get acquainted with the management of the programme in due time. If during the semester a student is observed to face difficulties with the study process (attendance, academic arrears), the student is invited to an individual meeting with his/her academic consultant to discuss the best possible solutions to the problem. Each academic consultant has to arrange meetings with 2-5 students per week. After a month, students are invited to the meeting again to discuss their progress and make sure the situation has improved.

At RTU International Cooperation and Foreign Students Department, students have a contact person for facilitating the immigration process. The contact person organizes immigration seminars and document examinations at the beginning of the semester. The Department arranges an appointment for students with the Office of Citizenship and Migration Affairs of the Republic of Latvia.

II - Description of the Study Direction (4. Scientific Research and Artistic Creation)

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

IDT is a consultation centre in the design and technology of textiles and products based on wood fibre. The research areas of IDT are targeted at the needs of the society and institutions: development of product and process prototypes from local renewable resources (hemp fibre, shives, nettle, limestone and dolomite, timber, conifer needles), nano-level modification of consumption textiles and veneer for protection against UV radiation, humidity, material

deteriorating and pathogenic microorganisms, improvement of the equipment of the armed forces and police, design of smart textiles and their product prototypes for various applications.

Research work is performed in the study programs of the study field on all levels. Bachelor's thesis is more practical, however, most of them contain elements of scientific research, the science part is considerably larger in Master thesis.

The scientific research of IDT is developed in the fields where the structural unit has experience and competences, infrastructure, cooperation partners. IDT has considerable research results and there are possibilities to transfer these results to the national economy and the public administration. These fields are related to the areas of "smart specialisation" according to "Guidelines of development of science and technologies and innovations 2014-2020 (1. Knowledge intensive bioeconomics; 2. Biomedicine, medicine technologies, bio pharmacy and bio technologies; 3. Smart materials, technologies and engineering systems).

Research and creation at IDT are performed according to the strategic goals of RTU and FMSAC by complying with academic freedom. The research of IDT is often inter-disciplinary, and its development is ensured by involvement in the work of the RTU research platforms. They provide inter-disciplinary research executed by several faculties and important for the national economy and society. The academic staff of IDT involved in the implementation of the study field "Manufacture and Processing", are actively engaged in the research work by performing research in 2 research directions: *Textile and clothing technology and Wood materials and technology*. Sub-directions can be distinguished in each direction, and these are as follows:

- Modification of natural and chemical fibre/ materials/ products and optimisation of their properties for improvement of the user's comfort and safety.
- Research of smart textiles, clothing, sewn products and relevant electronic systems and development of innovative solutions; development and innovative environmentally friendly products and technologies
- Research of wood and wood-based materials and structures, development of innovative solutions; development of the knowledge base of wood processing tools and machinery, historical constructions and terminology
- Design of sustainable products with a high added value of wood and other Latvian renewable resources and their processing waste, development and optimisation of manufacturing technologies
- Development of coatings containing modifications of fibre textiles and solid surfaces (synthetic polymers of a wood plate), bioactive and other functional substances and nano-webs
- Research of comfort in clothing; research of evaluation of the fit of clothing; research of functional textiles, clothing and protection means and improvement of design thereof; integration of 3D anthropometric data in CAD environments.

RTU has established six research platforms in the strategic research directions, namely, Energy and Environment, City and Development, Information and Communication Technologies, Transport, Security and Defence, Materials, Processes and Technologies. The research directions of IDT correspond to the RTU research platform "Materials, Processes and Technologies" and are closely linked with the activities implemented on all the levels of the study field "Manufacture and Processing", as well as are reflected in research projects, scientific publications and Ph.D. thesis that have been defended or are being developed.

IDT implements one Ph.D. study program (see additional information in Part III, the Ph.D. study program "Fibre Materials Science" (Clothing and Textile Technology until 2021). The Ph.D. study program is very important in the development of the study field "Manufacture and Processing", as it

not only provides involvement of new people in research and development of the IDT research directions but also renovation of the academic staff and scientific staff. The Ph.D. study program implemented by IDT is the only one in Latvia providing training of the top-level professionals in the science sub-branch of textile and clothing technologies.

All the Ph.D. students of IDT are involved in the development of a research direction of IDT, thus contributing to the development of the sub-branches of textile and clothing, wood materials and products, the material sciences of their technologies and the related sectors of the national economy in the region. Ph.D. students perform scientific work in research, design, development of innovative and traditional fibre materials and their products and introduction of relevant technologies. Ph.D. and Master's students provide valuable support in implementing scientific projects. Ph.D. and Master's students have been involved in all the scientific projects implemented by IDT (FLPP, Interreg, ERDF, ESF, Erasmus+). See more details in Part III, in the description of the Ph.D. study program.

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.

Scientific research plays a particular role in the development of the study field “Manufacture and Processing”, as it ensures high quality academic work. The development of the research directions of IDT is closely related to the study process. Research components in the work with students ensure participation of the academic staff in scientific projects, as well as various scientific events, like conferences, workshops, etc. It is important that the academic staff prepares scientific publications on performed research, as the research results are incorporated in the content of study courses in the form of theoretical conclusions and practical examples. This approach contributes to the students’ know-how regarding developments in the industry and modern scientific achievements, as well as promotes students’ interest in research and possible further involvement in it.

The link of scientific research with the study process is ensured by using the knowledge transfer principles, like the involvement of students in research, presenting the research directions and current research projects therein to students, allowing students to perform research work individually or within a group. Students also have an opportunity to participate in students’ scientific conferences, and the students of later years can participate in international scientific conferences by preparing scientific publications and participate in RTU national or international projects and contracted projects. Students can use the science infrastructure of the institute during their studies. The involvement of students in scientific projects is described in Section 4.5.

The link of scientific research with the study process can be assessed best by reviewing the topics and content of graduation papers. Students use all the knowledge acquired during the study process, as well as new specific knowledge related to the topic of the graduation paper in their graduation papers. Graduation papers of all the study levels can be split into groups corresponding to the research directions implemented by IDT (see the description in Section 4.1). Descriptions of the topics of the Bachelor, Master and Ph.D. thesis are presented in the descriptions of the relevant study programs.

The Bachelor level studies are practical by nature with elements of scientific research. Students solve issues important for the industry in the Bachelor thesis. The Master level students focus more

on the creation of new materials, as well as research related to the industry in the fields of clothing and textile design and improvement of manufacturing processes. By completing the Master's studies, there is a possibility to study in the Ph.D. study program implemented in the study direction.

The assessment of the integration of research results in the study process, in general, reveals that the conclusions and innovations derived from scientific research are both reflected in the content of study courses, as well as presented to students in lectures and integrated in the content of graduation papers. This allows the development of high quality study process targeted at cooperation, where students acquire the knowledge needed for growth.

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.

The academic staff of the study field “Manufacture and Processing” are actively engaged in promoting international cooperation in scientific research and participate in international scientific activities, like involvement in international projects, publication of research results in scientific journals and collections of articles of conferences indexed in databases, like Scopus and Web of Science, participation in international conferences, editorial boards of scientific journals and program committees of scientific conferences, promotion councils in foreign higher education institutions and review of the Ph.D. thesis developed abroad. During the reporting period, several Ph.D. students of IDT have performed research in foreign higher education institutions and scientific institutes, and foreign Ph.D. students and researchers have performed research at IDT. See more details in Sections 3 and 5.

The academic staff of IDT is involved in the promotion and habilitation councils of other higher education institutions are experts in the relevant scientific fields. Prof. A. Viļumsone has been a member of the Assoc. Professor. Dr. A. Rudolf Habilitation commission at Maribor University during the reporting period. Assoc. prof. I. Dāboliņa performed the duties of the official opponent during the pre-defense of the Ph.D. student of Buros Textile University N. Hernandez on 27 April 2018 in Buros, Sweden.

Professor S. Kukle has reviewed Ph.D. thesis of 5 foreign Ph.D. applicants and participated in the meetings of the promotion council. Reviewed Ph.D. thesis was related to the following topics: Structure Influence to the Properties of Knitted Compression Supports (defended on 01.10.2019, Kaunas University of Technology (KTU)), The Influence of Conductive Additives on the Mechanical Properties of Electrospun Mats (defended on 19.12.2018 Tallinn University of Technology); Analysis of Morphological, Geometrical and Mechanical Indices of Dogs’ Hair Fibres and Their Influence on the Properties of Textile Materials (defended on 12.09.2017, Kaunas University of Technology (KTU)); Development of spatial double-layer woven fabrics using Lithuanian folk textile motifs and investigation of their properties (defended on 28.03.2017, Kaunas University of Technology (KTU)), Evaluation and Forecasting of Properties of Terry Fabrics Woven from Natural Fibres (defended on 15.04.2016, Kaunas University of Technology (KTU)).

The following projects involving foreign partners have been implemented during the reporting period:

ERDF, 1.1.1.2. “Post-doctoral research support” project “*Structures and technology development of smart insulation materials for indoor microclimate regulation”* (1.1.1.2/VIAA/1/16/152). Implementation period from 16.10.2017 to 15.10.2020. Cooperation Partner: The Leibniz Institute for Agricultural Engineering and Bioeconomy.

Interreg Baltic Sea Region project “Smart and Safe Work Wear Clothing”. Implementation period from 01.03.2016 to 01.03.2019. Cooperation Partners: Tallinn University of Applied Sciences, Tallinn, Estonia; IW Textile Research Institute, Lodz, Poland; Vilnius University of Applied Sciences, Vilnius, Lithuania; SIA «SRC BRASA», Riga, Latvia; PW Krystian Sp. Zo.o, Pschisuha, Poland; AS Profline, Tallinn, Estonia; Oy PDService Ltd, Kokkola, Finland; Ansell Protective Solutions Lithuania, Ltd, Taurage, Lithuania.

RTU Scientific Research Project for Young Scientists “Nonwovens as Sound Reduction Increasers” (ZP2016/31). Implementation period from 03.05.2016 – 30.04.2017. Involved partner: Tallinn University of Technology.

RTU Scientific Research Project for Young Scientists “Humidity absorption properties of hardwood veneer produced by Sol-Gel process". Implementation period from 01.05.2016 – 30.04.2017. Involved partner: The Leibniz Institute for Agricultural Engineering and Bioeconomy.

Erasmus+ strategic partnership cooperation project 3481/2017/2017-1-ESO1-KA202-038419 “Circular Economy Innovative Skills in the Textile Sector”. Implementation period from 01.11.2017 - 30.12.2020. Cooperation Partners: Confederación de la Industria Textil - TEXFOR (Spain), Hellenic Fashion Industry Association - SEPEE (Greece), Technical University of Iasi – TUIASI (Romania), Centro Tecnologico das Industrias textile e do Vestuario de Portugal – CITEVE (Portugal).

Erasmus+ strategic partnership cooperation project 2018-1-LV01-KA202-046977 "Innovative design practices to achieve new innovative textile sector”. Implementation period from 01.12.2018 - 28.02.2021. Cooperation Partners: Gheorghe Asachi Jasi Tehniskā universitāte (TUIASI), ECORES SPRL, Agrupacion Empresarial Innovadora De Fabricantes De Muebles y Afines de La Region De Murcia (AMUEBLA), Footwear Technology Centre in Portugal (CTCP), Textile Trade Association - Textile Cluster (TTA-TC).

During the reporting period the contractual project “Performance and appearance of textile products” was implemented. Implementation period from 08.10.2018 to 01.04.2021. Cooperation Partner: Lenzing AG (Lenzing Aktiengesellschaft)

Commenced ERDF, 1.1.1.2. “Post-doctoral research support” project 1.1.1.2/VIAA/4/20/648 “Antibacterial and Antiviral Nano and Micro Fibrous Materials for Bioprotective Applications”. Implementation period from 01.10.2021 to 30.06.2023. Scientific consultants from Kaunas University of Technology and Tallinn University of Technology.

The academic staff of the study field “Manufacture and Processing” continue international cooperation. A new Erasmus+ strategic partnership project is being prepared. It is planned to have projects, like MeraNet, ERC, etc. in the next period. The defence of several Ph.D. theses is scheduled in near future, and this is related to the opportunity to use new PostDoc projects, within which international cooperation is envisaged in performing scientific research.

It is planned to develop more the research direction related to the design of sustainable products with a high added value from textile and textile processing waste in the next period. Cooperation with foreign research institutes will be required for developing it.

The involvement of the academic staff in research and international cooperation has a positive effect on the study process as a whole. International cooperation broadens the vision of the academic staff and allows the integration of new conclusions in the study process. The knowledge,

skills and competences of the academic staff obtained in international cooperation, as well as the acquired experience, is used in several study courses and graduation papers in study programs of all levels (see Section 4.5).

By developing current research directions and international cooperation, it is planned:

- To increase the number of publications in scientific journals indexed in Scopus and Web of Science databases.
- To prepare and implement more projects with the involvement of foreign partners.
- To promote the active involvement of the academic staff in the preparation and implementation of international projects.
- To promote the preparation of publications with foreign co-authors.
- To promote the active participation of the academic staff in scientific conferences.

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 direction by providing examples and the summary of the quantitative data on the activities in the field of scientific research and/or artistic creation relevant to the study direction over the reporting period, for instance, the publications, participation in conferences, activities in the field of artistic creation, participation in projects by the academic staff members, etc., by listing the aforementioned according to the relevance.

It is a requirement of RTU that academic staff are actively involved in research apart from their involvement in the study process. Professors and associate professors are re-evaluated and re-elected every six years. Candidates are obliged to comply with certain criteria in terms of scientific research, i.e., number of publications or patents, supervised Doctoral candidates, etc. (Decision of RTU Senate No. 649 “On approval of the RTU Regulations “On the Procedure for Election of a Candidate for the Position of Professor or Associate Professor and the Procedure for Assessing the Qualification of an Existing Professor or Associate Professor” in a new edition” as of 26 April 2021). In order to be allowed to supervise Doctoral students, the academic staff have to be approved experts in their fields, which is possible only if criteria regarding the number of publications/patents are met (decision of RTU Senate No. 602 “On Amendments to RTU Regulation on Doctorate” as of 26 September 2016). Approval process for the experts is organized by the Latvian Council of Science. The database of the experts is published on the National Research Information System (NRIS; http://sciencelatvia.lv).

Every year, the Rector and faculty deans sign agreements by which each faculty undertakes to achieve certain key performance indicators, many of which are based on research output, e.g., the number of publications/patents, obtained research project funding, etc. Achievement of these indicators has an impact on financing received by the faculty from the so-called performance-based funds.

RTU Research Support Fund (decision of RTU Senate No. 585 “RTU Regulation of Research Support Fund” as of 15 December 2014) aims at providing financial support for various research related activities, such as support for maintenance of research equipment, protection and licensing of intellectual property, covering of expenses related to the Doctoral study process, publishing of scientific journals, participation and organization of scientific conferences, support to researchers in

establishing new laboratories in a prospective research field. The Research Support Fund is an instrument to support research activities, which foster the development of the strategically important research fields.

Six research platforms in the main strategic research areas of RTU were established in 2013 as an instrument for fostering inter-disciplinary and inter-faculty cooperation of researchers in the areas of importance for industry and society. These platforms are as follows: “Energy and Environment”, “Cities and Development”, “Information and Communication Technologies”, “Transport”, “Materials, Processes and Technologies”, “Security and Defence. Each platform has a dedicated coordinator, and they comprise the Council of Coordinators responsible for implementing the activities within platforms. The Council is supervised by the Office of Vice-Rector for Research (Decision of RTU Senate No. 600 “On Approval of the Regulation of the Council of Coordinators of Research Platforms at Riga Technical University” as of 23 May 2016). Similar to the faculties, the platforms have the Research Program (Decision of RTU Senate No. 590 “On Authorization to Approve RTU Research Program by RTU Scientific Council” as of 27 May 2015; “Research Program of Technical University 2016–2020”), annual action plan and dedicated funding from the Research Support Fund. Internal project calls within the platforms are organized every year, allocating 90–120 thousand EUR in total to six projects selected on a competitive basis. A mandatory requirement for the projects is a minimum 20% industry co-financing and participation of more than one faculty. In the period of 2016–2020, 16 projects were supported and nearly 300,000 EUR of funding was allocated to the projects. Regular series of seminars and visits to companies are also organized by the research platforms to stimulate networking and cooperation with the industry.

The efficiency of these mechanisms can be illustrated by the growth of SCOPUS indexed publications in the period of 2013–2019. The total number of publications increased from approximately 440 publications per year in 2013 to 865 in 2018. The number of SCOPUS publications per researcher (expressed in full-time-equivalent (FTE)) increased from circa 0.9 in 2013 to circa 1.5 publications/FTE per year in 2018 (the data were obtained from Elsevier “SciVal” database on 17 June 2019).

The academic staff of the study field “Manufacture and Processing” is involved in both scientific research and artistic creation. Involvement of the academic staff in scientific research is encouraged by various support mechanisms as well as the requirements of the higher education institution for ensuring compliance with the position.

The involvement of academic staff in scientific research is assessed in the number and quality of publications. From 2013 to 2021, 866 publications have been prepared in the relevant field of science of the direction “Production and processing” (see the annex "List of the publications, patents, and artistic creations of the teaching staff over the reporting period"). 603 of them are indexed in the internationally cited databases Thompson Reuters Web of Science and Scopus. 186 are Category B publications published in conference proceedings, while 417 are Category A publications published in industry journals.

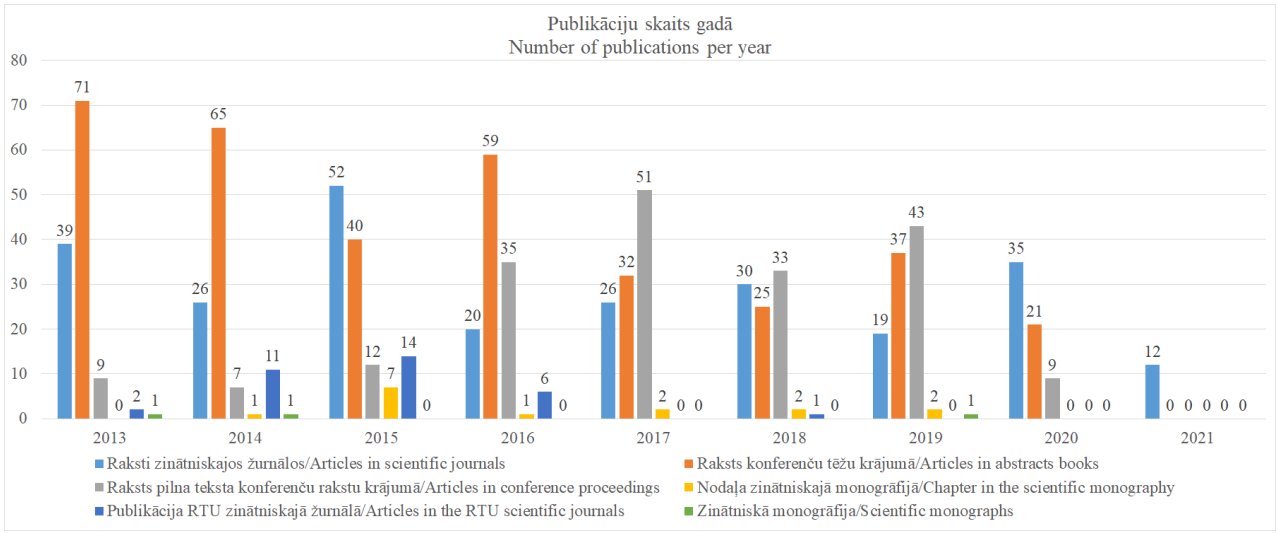


Figure 4.1. Number of publications per year

On average 109 publications per year have been published (Figure 4.1.). A slight decrease in the number of publications can be seen recently, and this is related to the requirement of the higher education institution to prepare higher qualify publications that are published in scientific journals of the industry and to focus less on publications in the collections of articles of conferences. Quality requirements continue increasing, which means that the quality of publications also continues growing. The number of publications in 2020 was also affected by the pandemic.

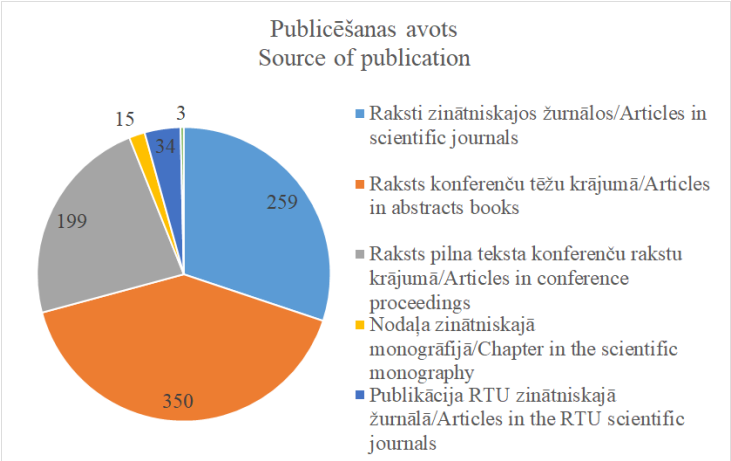


Figure 4.2. Source of publication

A large part of publications is published in the collections of conference articles providing the full text and also collections of conference theses (Figure 4.2.), which evidence active involvement of the academic staff in scientific activities, thus promoting broadening of knowledge and scientific cooperation provided by participation in science events, like conferences and seminars.

Publications have been cited in 312 instances, which attests to a high added value and considerable scientific contribution.

Most of the publications are indexed in some scientific databases. The biggest part of publications can be found in SCOPUS database (359 publications) and WoS (244 publications). Some publications can be found in other databases, like EBSCO, ScienceDirect and others. 3 scientific monographs and 15 chapters in scientific monographs have been published on the themes of the study direction. 10 Ph.D. thesis has been defended in the reporting period (in IDT alone, 2 Ph.D. thesis are scheduled to be defended by the end of 2021 and 4 Ph.D. thesis are scheduled for defence by February 2022.

During the reporting period from 2013 to 2020, the academic staff involved in the implementation of the study field “Manufacture and Processing” has been involved in 29 various projects (Figure 4.3.), like projects of the European Regional Development Fund, Erasmus, Interreg, Fundamental and Applied Research projects, projects of the European structural funds, the State Research Program and the RTU internal research projects and projects of young scientists. Taking into account that the implementation term of projects is usually from one to four years, involvement of the academic staff in projects should be viewed as very successful.

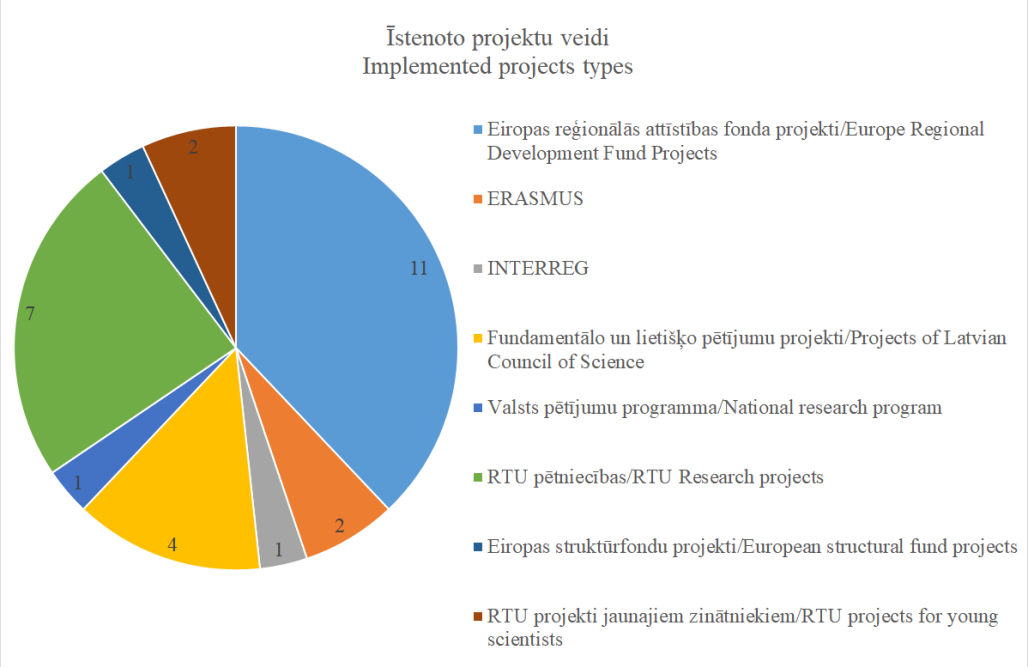


Figure 4.3. Types of the implemented projects

The academic staff of the study field “Manufacture and Processing” works in the field of materials sciences, therefore scientific projects are targeted in the direction of development of various materials and products made of them.

Research in the field of development of smart clothing has been performed. Research for improvement of the business of manufacturing of workwear in the region of the Baltic countries has been performed in cooperation with partners of the Baltic region. Also, work has been performed for the development of energy independent systems and the development of a measurement system based on textile sensors, as well as the application and integration of these elements in a set of smart garments for medical monitoring in the field of orthopaedics. An energy independent electronic system, which can be integrated into clothing, has been developed for the measurement of the human physiologic and ambient environment parameters and the communication by a remote sensor.

Research for promotion of the use of domestic renewable resources by developing prototypes of products and technologies (wood, plants - nanofibre, insulation materials, composite materials, improvement of the existing material properties) has resulted in projects where work with renewable resources has been performed, in particular, flax and hemp. In cooperation with the Institute of Physical Energy, the efficiency of use of energy resources and energy in buildings has been improved by developing technology and producing plates of hemp mix. The PostDoc project has been a continuation of this project, developing smart, transferring heat insulation material suitable for green construction, for accumulation and return of latent heat with improved sound insulation properties, by using environmentally friendly components and bio-technologies, which will ensure effective regulation of indoor microclimate by allowing reduction of heating and

ventilation costs, as well as the effect of the structure of this material upon heat insulation parameters, has been studied and its production technology has been approbated.

Also for the purpose of promoting the use of domestic renewable resources by developing prototypes of products and technologies, research has been performed for use of flax and hemp in textiles, research has been performed in the field and technical textiles, new materials have been developed.

The academic staff of IDT has been involved in the State Research Program aimed at restricting the spread of Covid-19 infection and other diseases in health care and high risk zones, by developing safe, innovative technologies and products for collective and individual protection of residents and professionals.

Several projects have been related to modification of natural and chemical fibre, their materials and products and optimisation of properties for improving the user's comfort and security, development of new nanolevel structures (composite nanofibre) and technologies, their integration in new applications (medicine, construction, state institutions - the armed forces, police, social case, households), nanolevel modification and development of technologies for improvement of the use properties and granting of additional properties to materials, items (protection against microorganisms, UV radiation, easier to clean/ washable, better humidity resistance). The PostDoc project commenced as the continuation of this research has the scientific goal to develop a manufacturing technology of multi-layer nano and microfibre composite materials with antibacterial and antivirus properties. The research is focused on the reduction of Covid-19 effect and the development of innovative solutions in the field of solving public health issues.

Research is also performed in the direction of solving ecological issues, for example, the possibilities of recycling and utilisation of textile were investigated for promoting sustainability of the textile industry, as well as adjustment of the indoor microclimate with natural means, arrangement of the living environment in compliance with the use, analysis and optimisation of the life cycles of products. The result of several projects presents a contribution to the development of the circular economy.

The research performed by the academic staff involved in the implementation of the study field "Manufacture and Processing" has resulted in preparation and publication on 1 patent. 3 patents have been submitted in 2019. The publication is envisaged in 2021 or 2022.

The research work should be evaluated as successful, considering the number and quality of publications, as well as the involvement of the academic staff in projects.

4.5. Specify how the involvement of the students in scientific 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 direction in scientific research and/or artistic creation activities by giving examples of the opportunities offered to and used by the students.

RTU has mechanisms for the involvement of students from all study levels and programs in research activities. There are activities aimed at strengthening Doctoral studies and providing career opportunities during the post-doctoral period to young researchers.

Doctoral grants are provided to Doctoral students on a competitive basis. International calls are

made to attract post-doctoral projects. In addition, the internal Research Excellence Grant for young scientists was established in 2018 as a new initiative, providing 270 000 EUR for the 3-year period based on international competition (conditions are similar to EC ERC grant with international call and evaluation performed by external, i.e., foreign well-recognized researchers). The grant allows young and talented researchers to establish their own research groups and make research careers at RTU. Internal project calls provide additional funding for publishing articles in SCOPUS/WoS indexed editions, and internal projects within 6 research platforms stimulate the involvement of Doctoral and Master students in multi-disciplinary and inter-faculty research projects in cooperation with the industry. The Research Support Fund (10% of the research base funding is allocated to this fund) provides support to Doctoral students (attending conferences, publishing papers and thesis, etc.). Employment of Doctoral students and post-doctoral researchers at RTU went up from 0 FTE in the period of 2013-2016 to 88 FTE (Doctoral students) and 97 FTE (Post-doctoral researchers) in 2018. 17 post-doctoral 3-year long projects with total funding of 2.28 million EUR were launched in 2017. The funding covered salaries, costs of materials and mobility, as well as support for further development of research skills (circa 134,000 EUR are allocated to one project). 16 post-doctoral 3-year long projects were launched in 2018 and 12 post-doctoral 3-year long projects were launched in 2019 with total funding of 3.7 million EUR. 18 post-doctoral 3-year long projects with total funding of 2.4 million EUR have been launched in 2020. In 2021, at least 10 projects should be launched The post-doctoral projects allow attracting new researchers to RTU from abroad and other Latvian research institutions, and providing academic career opportunities to Doctoral students who graduate from RTU.

Internal project calls within the six research platforms, which are organized every year, have criteria regarding the involvement of students in the project, giving an additional score if students at the Bachelor, Master or Doctoral level are involved in the project.

The Design Factory (DF) of RTU (see additional information about the DF below) organizes the study course "Vertically Integrated Project" (VIP), during which interdisciplinary student teams develop a challenging long-term research project under the guidance of experienced researchers. The course is implemented in cooperation with researchers from the Georgia Institute of Technology (the USA). Within the course, cross-disciplinary student teams are assembled, bringing together students from at least three different study programmes, and ranging from first-year Bachelor students to Doctoral students, as well as involving pupils from the Engineering High School (EHS) of RTU (see additional information about the EHS below). During the course, students participate in research work under the supervision of RTU researchers, working together with students of other study programmes and gaining experience in research as well as in team and project work. At the end of the course, each team presents its progress and demonstrates the results obtained. For example, during the spring semester of 2019, the call for VIP courses was announced for three topics:

- sensor systems and networks (group leader Prof. Jurģis Poriņš);
- wastewater treatment (group leader Prof. Tālis Juhna);
- energy efficient houses (group leader Leading Researcher Jānis Zaķis).

The course is registered as a free elective study course and two credit points are assigned to the student in the semester.

The Engineering High School of Riga Technical University is the first general secondary education establishment in Latvia that has been founded within the framework of a university. It is the place where the most talented Latvian pupils can acquire the study courses in exact and natural sciences at an advanced level to get prepared for engineering studies. At the EHS, special attention is paid to the integration of engineering studies and scientific research activities into the study process.

A success story is an establishment of DF Labs (http://rtudf.rtu.lv) for design and prototyping. The

idea of having the Lab at RTU was inspired by a positive example of Aalto University in Finland. Its task is to provide expertise and shared infrastructure for developing prototypes of new products and technologies, based on ideas of students and researchers. RTU DF also works with industry, start-ups and spin-offs and has established a very good reputation. We could observe that it considerably improved the involvement of students at all study levels in research and innovation activities and promoted cooperation of RTU with industry

The students of the study field “Manufacture and Processing” are actively engaged in scientific research by involving in the implementation of large and small scale projects, resulting in the development of the Bachelor, Master and Ph.D. thesis in all the study programs of the direction.

For example, four Ph.D. students participated in the European Social Fund project, programme “Human Resources and Employment”, Activity 1.1.1.2 “Attracting human resources to science” “Development of innovative technologies for heat and cold storage and production” 2013/0064 / 1DP / 1.1.1.2.0 / 13/APIA/VIAA/050. The project has been implemented in cooperation with the Institute of Physical Energy and the Agency of the “Scientific Institute of Agricultural Machinery” of the Latvian University of Agriculture. The research was carried out in two directions – improvement and adaptation of solar energy cooling system technology to conditions in Latvia and development of hemp mixture board raw material production technology. Two young scientists have defended their Ph.D. thesis and continue the scientific work at the institute.

The operational programme “Growth and Employment” 1.1.1. Specific support target “Improve the research and innovation capacity of Latvian research institutions and the ability to attract external funding by investing in human resources and infrastructure” 1.1.1.1. Measure “Practical Research” the project of the 1st stage “Synthesis of textile surface coating modified in nano-level and energetically independent measurement system integration in smart clothing with functions of medical monitoring” (2588/2017/1.1.1.1/16/A/020), where the scientific supervisor was professor S.Kukle, involved 4 Ph.D. students. The project objective was to gain more knowledge and understanding of smart clothing elements, such as textiles, energy independent systems and the development and improvement of a measurement system based on textile sensors, as well as the application and integration of these elements in a set of smart garments for medical monitoring in the field of orthopaedics. During the project implementation, the Bachelor's and Master's thesis were developed on the project topic. One young scientist has defended his Ph.D. thesis, two continue Ph.D. studies and develop the project conclusions.

In project 1.1.1.2. “Support for Postdoctoral Research” Structures and technology development of smart insulation materials for indoor microclimate regulation (3284/1.1.1.2/VIAA/1/16/1520), supervised by Professor S.Kukle and post-doctoral student/implementer E.Kirilov, a Ph.D. student was involved. The goal of the project was to develop a smart, transferring heat insulation material suitable for construction, for accumulation and return of latent heat with improved sound insulation properties, by using environmentally friendly components and bio-technologies, which will ensure effective regulation of indoor microclimate by allowing reduction of heating and ventilation costs, as well as to study the effect of the structure of this material upon heat insulation parameters and to approbate its production technology. The project conclusions are developed in the Ph.D. thesis scheduled to be defended in February 2022.

Four Ph.D. students were involved in the Erasmus+ project “Circular Economy Innovative Skills in the Textile Sector”, 3481/2017/2017-1-ESO1-KA202-038419), supervised by the assoc. professor D. Beļakova. The project was focused on solutions to sustainability matters in the textile industry. The project results were integrated into the study course “Design and technologies for sustainable development”. One Ph.D. student has defended her Ph.D. thesis.

Three Ph.D. students were involved in the Interreg project of the Baltic region “Smart and Safe

Work Wear Clothing" where the scientific supervisor was I. Dāboliņa. The project goal was to develop the business of manufacturing smart workwear in the Baltic Sea region (BSR). The project results and conclusions are integrated into several study courses related to clothing design. Two Ph.D. students continue developing the issues of the research part of the project. The topics of the project were also developed in the graduation papers of the Bachelor level students.

RTU offers increasing possibilities of involvement of students in scientific research by granting support scholarships for the performance of research, for example, the Ph.D. studies and the Master studies grants. Also the students of the study field "Manufacture and Processing" actively engage in the use of various support mechanisms for the implementation of their ideas. This promotes the link between the study process and the scientific research in study programs of all levels.

IDT works actively to involve students in research by encouraging cooperation with the academic staff involved in research and supervising the Bachelor, Master and Ph.D. level assignments of students. The topics of the Bachelor, Master and, in particular, Ph.D. thesis are related to the research directions developed in the structural unit described in Section 4.1. However, along with the science development, also interdisciplinary research develops often exceeding the competences of IDT, and consultants or co-supervisors are sought for such assignments in the competent RTU structural units, in Latvia or abroad (see Section 5.1). This approach expands the vision of students and their interest to engage in scientific research.

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 study direction subject to the assessment, by giving the respective examples and assessing their impact on the study process.

The study process implemented in the study field "Manufacture and Processing" has always been creative and related to innovations in the design of products and processes. Students regularly participate in internal and external exhibitions and competitions of various types. IDT has been organising annual exhibitions for the will-be holders of the Bachelor's degree as a part of the Bachelor thesis since 2005. Students of all levels participate in organisation of exhibitions. This encourages mobilisation of students to work in a creative environment, to understand the environment of organisation of exhibitions, this is an opportunity for students of junior years to see the work of senior students.

Within the framework of the study process, students regularly go on exploring expeditions outdoors or indoors by solving projects related to the study process.

Starting from the academic year 2017/2018, the Bachelor level students complete the study module for developing the professional competence of business, technology transfer and product development, i.e. "Innovative Product Development and Entrepreneurship". The study methodology of the study module is based on joint creation, integration of the parties involved in the development of new products and commercialisation in the study process, provision of continuous feedback on the results of the group work of the students involved in the study process and their achievements. It is targeted at learning by doing and developing integrated theoretical knowledge.

Execution of the study project in study courses "Planning of industrial collections" and "The Development of Industrial Clothing Collections" has been organised as the teamwork for the Bachelor level students in the specialisation of clothing design, construction and technology for four

years. Teams are created according to the model of experimental sections of clothing manufacturing undertakings where a designer, a constructor and a technologist work together in developing an industrial collection. This allows students to feel themselves in an actual work situation where team solutions need to be found and a collection that can be industrially manufactured for a defined target audience needs to be designed. Students learn to work together, to assume and delegate responsibility for a particular stage of work. The group assesses the work contributed by each member.

The study process of the study program “Design Engineering” is based on project-focused education. Students have to implement 3 study projects related to the topic of their Master's thesis during 2 study years. The Master thesis is the third project. In this way, students are involved in the planning and execution of the Master's thesis since the start of their studies.

II - Description of the Study Direction (5. Cooperation and Internationalisation)

5.1. Provide the assessment as to how the cooperation with different institutions from Latvia and abroad (higher education institutions/ colleges, employers, employers’ organisations, municipalities, non-governmental organisations, scientific institutes, etc.) within the study direction contributes to the achievement of the aims and learning outcomes of the study direction. Specify the criteria by which the cooperation partners suitable for the study direction 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 employers.

The choice of cooperation partners is based on the previous experience of the study direction and cooperation of experts with foreign institutions in studies, science, project development, membership in associations, etc. forms.

Since the beginning of its operation, IDT has had successful cooperation with entrepreneurs, organisations and state institutions. The cooperation is strengthening year by year and new forms emerge, as the mutual interest in securing successful results increases. Cooperation with various professional organisations takes place by organising seminars, also by performing scientific cooperation, by participating in the work of the industry associations and receiving advice on the development of industries and necessary improvements in the content of education.

RTU IDT and the study field have close cooperation with the Association of the Light Industry Undertakings, the Latvian Association of Wood Processing Entrepreneurs and Exporters, and the Latvian Association of Designers by involving association representatives and head in the work of the commission of the study direction, as well as in information exchange and research. IDT has been a member of the association “Latvian Furniture” since 2017. The association “Latvian furniture” is a member of the Latvian Forest Industry Federation. The academic staff of the study field continues working in the expert council of the branch of textile products, clothing, leather and leather products of the Latvian Confederation of Employers as invited experts. Representation was also ensured in the Latvian Design Council of the Ministry of Culture for many years. At present, there is closer cooperation with the Latvian Association of Designers where a representative of the Commission of the Study field works.

The main areas of cooperation and activities within the study field are as follows:

- Improvement of the study process and the content of study programs, provision of the quality of their implementation, forecasting of the need for professionals;
- Provision of the students' internship and professional development;
- Review and supervision of the study graduation papers by offering to engage in solution of the issues topical for the industry undertakings;
- Contracted research projects, contracted assignments and valorisation possibilities of the developments of the students' projects ;
- Involvement of the professionals of undertakings in the study process in open lectures and classes, their inclusion in the state examination commissions.
- Provision of out-of-studies events, for example, study trips, etc.

There is a long-term cooperation with the board member of SIA "Solutions", who manages the work of the state examination commission and the students' internship at the undertaking for the students of the specialisations of the clothing design and technologies. The executive director of the Latvian Association of Wood Processing Entrepreneurs and Exporters regularly manages the work of the state examination commission for the specialisations of wood products and interior design and technologies. The chairman of the board of the Latvian Association of the Light Industry Undertakings and many managers and senior professionals of the industry undertakings regularly participate in the work of the commissions. 36 cooperation agreements have been concluded with the undertakings of the industries related to the study direction.

During the reporting period, many Bachelor and Master graduation papers have been developed in cooperation with manufacturing undertakings: SIA Spectre Latvia, SIA Snickers Production Latvia, SIA Fristads Kansas Production, New Rosme, Lauma, SIA Aristocrat Kids, SIA Rubrig, SIA AM furnitūra, AS Latvijas Finieris, SIA Roug, 66 NORTH BALTIC, Artex Latvia, NYBO Dobele, etc.

Seminars organised by manufacturers, industry exhibitions and trips to undertakings definitely expand the professional knowledge of the future professionals. The students of the IDT specialisation of wood products and interior design and technologies have been supplementing their professional knowledge in the seminar organised by Knauf: Knauf Academy, for several years in sequence. In 2018 and 2019 manufacturing undertakings were also willing to accept the academic staff of IDT for internships.

Several research projects of products and technologies have been performed in cooperation with undertakings, for example, in cooperation with SIA 'Tonus Elast" the change of the properties of compression socks during their use were investigated; the technology of manufacturing of the plaster mesh was developed for the undertaking AS "Valmieras stikla šķiedra" for achieving the necessary mechanical properties of the end product. Within the framework of contracts, a manufacturing section was designed for the undertaking SIA Catamaran Sports; expert examination of the labour intensity of products was performed for the undertaking SIA New Rosme and the prototype of underwear for athletes, its manufacturing documentation was developed for the undertaking SIA EchoTech.

IDT has close **cooperation with many schools in Latvia, higher education institutions and foreign higher education institutions, research institutes.** Totally 108 cooperation agreements have been concluded. Between RTU and ***the Latvian University of Agriculture*** (LUA), ***the University of Latvia*** (LU), ***Riga Stradins' University*** (RSU) on mutual cooperation in the implementation of the study process and science development matters providing for cooperation on all the areas, starting from free student mobility between both higher education institutions up to the implementation of joint projects in various areas. IDT has established successful cooperation with the wood processing department of the LUA Faculty of Forest. The

Bachelor level students are involved in joint cooperation projects related to the search for the application of new wood materials in products and interior. The Master and Ph.D. level students visit the department and the "Institute of Research and Development of Forest and Wood Products" linked to it, resulting in successful cooperation by performing research and developing the study graduation papers with the support of the academic staff of the cooperation higher education institution. LUA scientists participate in the review of the Ph.D. thesis and participate in the work of the promotion council.

Joint publications, participation in international conferences, joint projects are implemented with the Latvian cooperation partners in science: ***Institute of Physical Energetics*** (Latvia) – joint projects and research cooperation; ***Latvian State Institute of Wood Chemistry*** (Latvia) – joint projects (feasibility study of the preparation of lignocelluloses fibre and shives and their integration in biodegradable composite materials and plate materials) and research cooperation during development of Ph.D. thesis, joint publications; ***Riga Stradins' University*** (Latvia) – research cooperation, joint publications.

At LU Faculty of Biology, Institute of Microbiology and Biotechnology, within the development of the Ph.D. thesis, large-scale experiments were carried out for the assessment of the antimicrobial properties of samples.

Joint research has been performed with **"Latgale Agriculture Science Centre"** in order to study the traditional hemp processing methodology and perform tests of materials.

IDT professor S. Kukle has been working as the textile industry expert in the Latvian Certification Centre (LATSERT) and the Latvian National Accreditation Bureau (LATAK) for many years.

IDT has good cooperation with the ***Latvian Academy of Art*** (LAA) in conducting the study processes. The academic staff of LAA conduct the special composition study course, the industrial collections planning study course in the study programs of the study direction, are members of the qualification commissions when the qualification of the product designer is conferred, and the students of the Fashion Art study program of the Design Department of LAA completed the computer design study course in the CAD/CAM laboratory of IDT. In case of necessity consultations on a specific technology, issues are provided to the students of the Academy of Art.

IDT provides methodological assistance to ***Rēzekne Academy of Technologies*** (RTA) in the implementation of the college study program of clothing design and technologies. Some study courses of the college study program of RTA "Clothing Development and Design" can be implemented with assistance by the academic staff of IDT.

For the attainment of the goal of the study field and the learning outcomes of studies, **cooperation with the leading higher education institutions of Europe and Baltics is very important, they train professionals and perform research in the field of textile, wood and other fibre materials and products.**

In 2016, by supporting the initiative of the Department of Clothing and Textile Technology, RTU FMSAC was admitted to the Association of Global Textile Universities Autex. Within this organisation there is cooperation with 40 higher education institutions where the new professionals of the textile industry study and active scientific work are being done. As a member of the association, IDT and its academic staff participate in the annual Autex scientific conferences by presenting reports and in the meetings of members, thus gaining valuable opportunities for scientific activity and sharing of experience of teaching students with other global textile universities. The academic staff of IDT performs the duties of the members of the scientific committees of Autex conferences and the reviewers of articles.

The academic staff of IDT has close cooperation with the leading Baltic universities. There is a regular exchange of students, Ph.D. students and professors with **Kaunas University of Technology** (KTU), as well as expert examination of scientific works. Ph.D thesis are supervised jointly with KTU professors, there is joint work on the promotion councils of both higher education institutions. Cooperation with **Vilnius University of Applied Sciences** is mainly in the field of research, mutual consultations in science, exchange programs, expert examination of scientific works, with **University of Tartu** - research cooperation, consultations of Ph.D. students, joint publications; with **Tallinn University of Applied Sciences** and **Tallinn University of Technology**– research cooperation and joint projects.

During the report period cooperation has been developed with the scientific research institutions and higher education institutions of Nordic countries: in Finland with **Aalto University** with **VTT Technical Research Centre** of Finland and with **Centria University of Applied Sciences**; in Sweden with the **Swedish School of Textiles of University of Borås** – research cooperation, expert examination of scientific works and students' mobility. Cooperation has been established and developed with P**olitecnico di Milano** in Italy and the **University of Minho** in Portugal – research cooperation, guest lectures of professors.

In cooperation with universities and research institutes in Germany - RWTH **Aachen University**; **Niederrhein University of Applied Sciences** and L**eibniz Institute for Agricultural Engineering and Bioeconomy**, Postdam, joint projects are being developed and this plays an important role in the Ph.D and Post-Doctoral scientific research and development and publication of joint scientific publications.

In 2015 IDT participated in the project "Smart Textiles for healthcare" (STAR) funded by the Federal Ministry of Education and Science of Germany, jointly with partners from Aachen University (Germany) and Buros University (Sweden),

In cooperation with Leeds University Nonwoven Research Centre, a part of the Ph.D. thesis was developed in Great Britain.

Research cooperation, internships of Ph.D students and consultations take place in cooperation with the Polish research institutes Textile Research Institute and Institute of Natural Fibres and Medicinal Plants) in Poznan.

Cooperation with higher education institutions and research institutes of Germany, Great Britain, Lithuania and Poland has resulted in four successfully defended Ph.D thesis during the reporting period.

There is long-term cooperation on jointly implemented Erasmus+ projects and in the mobility of academic staff with (ITU) (Gh. Asachi Technical University of Iasi) in Romania. Within Erasmus+ and Interreg projects IDT cooperates with several foreign institutions, associations of undertakings, higher education institutions and manufacturing undertakings.

In cooperation with the professional organisations of Macedonia, Belgium, Portugal and Spain: Textile Trade Association - Textile Cluster (Former Yugoslav Republic of Macedonia), Ecores SPRL (Belgium), Centro Tecnologico de Calcado de Portugal, Agrupacion Empresarial Innovadora de Fabricantes de Muebles y Afines de La Region de Murcia (Spain) and the Romanian higher education institution Universitatea Tehnica Gheorghe Asachi Din Iasi (Romania), ERASMUS+ KA2 activities were implemented in the project of the Strategic Partnership Sector "Innovative design practices for achieving a new textile circular sector". IDT was the leading partner in the implementation of this project.

Within the international research project No. R006 of the inter-regional cooperation program

INTERREG, European Union Structural Funds Objective 3 of “European Territorial Cooperation” programme “Smart and Safe Work Wear Clothing”, IDT cooperated with the researchers’ groups of five universities and businesses of the Baltic region - Centria University of Applied Sciences Ltd (Finland as the leading partner), Poland, Lithuania, Estonia and Latvia. The project was aimed at adaptation of the production orders and integration of IT technologies in the work-wear clothing, as well as improvement of the management of the supply chain.

Cooperation of students’ mobility has developed also with higher education institutions of other EU countries: University of West Attica (Greece), Technological Educational Institute of Athens (Greece), Hochschule Niederheim (Denmark), Salzburg University of Applied Sciences and Fachhochschule Salzburg GmbH (both Austria), Polytechnic University of Valencia (Spain).

As from 2008, IDT is responsible for the contract “Provision of expert examination services” signed by and between the Provision Command of the National Armed Forces of the Republic of Latvia and the Science Vice-Rector of RTU. Numerous research and expert examination services are performed within the above contract in the area of provision of functional clothing and its raw materials for the needs of the Latvian army.

IDT has had permanent cooperation with the State Education Development Agency (SEDA) and the State Education Content Centre (SECC) in the field of development of the professional education. The academic staff of IDT develop the practical assignments for the professional education competition “Skills Latvia” organised by SEDA in wood processing and garment production, as well as participates in the evaluation as heads and members of commissions. They also train competitors and participate in jury commissions at WordSkills competitions.

In cooperation with SECC, within the ESF project “Improvement of the industry qualification system for development of the vocational education and provision of quality”, the academic staff of the study field developed modular education programs, the content of the examination of the professional qualification, have prepared training aids and methodological materials for teachers, have worked in the task forces of development of the profession standards of the industry.

IDT regularly offer education courses to teachers, participates in the annual fair “School”, regularly informs teachers of vocational schools on the possibilities to study at RTU and the requirements for admission to the education programs of the design field, regularly organise international and local seminars for professionals and education staff on topics important in the industry, for example, the circulation economics in the textile industry, in the wood industry and the design field. Professors and researchers of IDT visit schools several times a year to inform about possibilities to study textile, clothing, wood materials processing technologies and design, and professors have close cooperation with vocational schools, technical schools and private secondary schools (RMMT, RDMV, Patnis etc.), by teaching design, architecture and other important study courses and preparing them for admission exams and studies in RTU. There is regular cooperation with Liepaja State Technical College. Every year well prepared students willing to study are admitted from the best Latvian vocational schools and technical schools.

5.2. Specify the system or mechanisms, which are used to attract the students and the teaching staff from abroad and provide a description of the dynamics of the number of the attracted students and the teaching staff.

To attract foreign students to RTU, two communication target groups are mainly addressed:

- the internal: management team; general staff, academic staff; existing students;
- the external: prospective foreign students (foreign students studying in Latvia, foreign pupils and students, parents of foreign pupils and students); foreign graduates; mass media; opinion leaders; educational institutions; student recruitment education agencies; diplomatic and consular missions of the Republic of Latvia.

The communication strategy uses several types of information channels, choosing the most appropriate for each target audience – paid advertising channels, earned and owned ones. Marketing communication is an essential part of addressing foreign audience using all the traditional marketing tools – advertising in media and other channels, event marketing, direct marketing, digital marketing etc. The main marketing tool used to reach foreign audience is participation in various educational exhibitions and seminars organized by educational agencies in target markets. Continuity in the provision of information and promotion of studies is ensured by the long-term partner universities and educational agencies.

Public relations tools (press releases, media events, face-to-face meetings, interviews, opinion polls, etc.) and RTU social media channels (Facebook, WeChat, WhatsApp, YouTube, etc.) are used in corporate communication. RTU internal channels (ORTUS portal, email, etc.), information seminars and special events are used for internal communication.

RTU foreign student enrolment rates are summarized starting with academic year 2012/2013, indicating whether the student is pursuing undergraduate or graduate studies. The number implies only students enrolled in the first year.

The total number of applications processed at RTU is much higher than the number of students actually enrolled. For example, in academic year 2015/2016, 626 applications were received from prospective students, while 349 students commenced their studies; however, in academic year 2016/2017, 670 applications were received, but 445 students were enrolled; in academic year 2017/2018, 1813 applications were received, but 632 students were enrolled; in academic year 2018/2019, 2627 applications were received, but 774 students were enrolled; in academic year 2019/2012, 3340 applications were received, but 870 students were enrolled.

Within the study direction, two study programs currently offer studies in English - the professional Bachelor study program “Clothing and Textile Technology, as from the academic year 2018/2019, and the professional Master study program “Design Engineering” as from the academic year 2020/2021 (see the self-assessment reports of the study programs). The number of incoming students is low. In the professional Bachelor's study program “Clothing and Textile Technology” 4 students came in 2018 and 5 students in 2019. The increase of the number of foreign students can be expected in the Master level studies.

Within the framework of incoming mobility, 8 Ph.D. students from the Kaunas University of Technology came to IDT over the period from 2015 to 2017 for various periods. Ph.D students performed research about fabrics and electricity conducting threads in the IDT laboratory of research of textile materials under supervision by I. Baltina, and two Ph.D. students successfully completed the study course “Research of textile materials”. One Ph.D. student had an internship at the Laboratory of Anthropometrics. A Ph.D. student, supported by a grant of the Ministry of Education and Science of Lithuania and Latvia, had an internship performing research on ethnographic textiles. Two Ph.D. students learned about nano-spinning technologies at the laboratory of material sciences.

Within the framework of COST program, from 1 December 2015 to 31 January 2016, a Ph.D. student from Genova University (Italy) has internship and performed research on the topic “Characterisation and optical properties of polycarbonate transparent wire from a mixture of

solvents with cerium nanoparticles" under supervision by S. Kukle (Figure 5.1.).

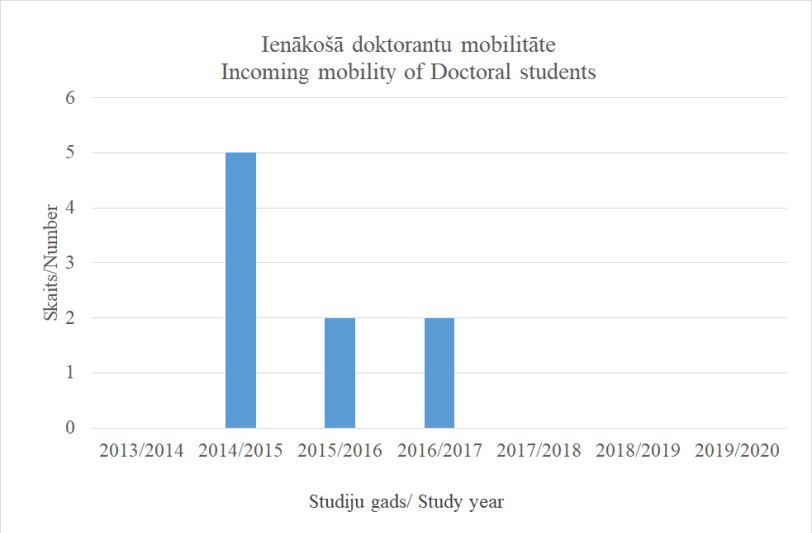


Figure 5.1. Incoming mobility of doctoral students

For the purpose of attraction of foreign students, during the reporting period, in cooperation with the RTU Department of International Cooperation and Foreign Students, 3 international summer schools were organised aimed at introducing the methods of processing of textiles, clothing and wood products to foreign students in practical classes, as well as to provide an insight of the study programs of the study direction, the research directions, to introduce the higher education institution and Latvian undertakings. In the international summer school "Clothing Design and High Tech" in 2014 there were 24 Bachelor and Master level students from 13 countries (Latvia, Great Britain, Sweden, Germany, France, Estonia, Lithuania, Uzbekistan, Holland, Kazakhstan, Luxembourg, Italy and Poland); in the summer school of 2016 "A Journey Beyond the Traditional Wooden Craft and Art" there were 13 students from 7 countries and in the summer school of 2017 „Woodcraft and art" there were 26 students from more than 10 countries.

In April 2016 the assoc. professor U. Briedis visited Nepal and Bangladesh on a business trip organised by the RTU Department of International Cooperation and Foreign Students and met the heads of the higher education institutions of these countries and potential students. For the purpose of attracting students, the English version of the professional Bachelor's study program "Clothing and Textile Technology" "Clothing Technology" was presented.

During the reporting period, 38 students have visited the below listed European higher education institutions (Figure 5.2.) within Erasmus+ exchange programs: University of Applied Sciences, Hochschule Niederrhein (Germany); Polytechnic University of Milan/ Politecnico di Milano (Italy); Kaunas University of Technology (Lithuania); University of Boras (Sweden); Ege University (Turkey); the University of West Attica and Technological Educational Institute of Athens (Greece); Polytechnic University of Valencia (Spain); Salzburg University of Applied Sciences (Austria).

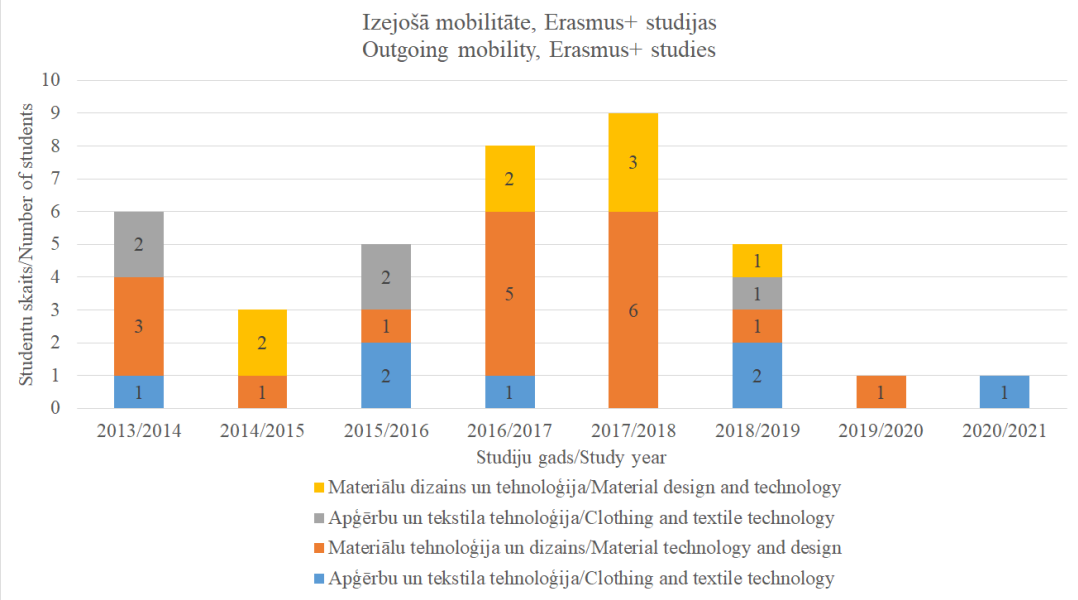


Figure 5.2. Outgoing mobility, studies

Within the framework of Erasmus+ exchange programs, the internship was done by 10 students (Figure 5.3.) in Croatia (NEBO Design company), Sweden (Zisser Studio), Spain (Innoarea Design Consulting; Grupo Empresarial Dakota Peninsula Iberica S.L.U; My Language Skills S.L.U.; CWB Spain S.L.), Great Britain (Robinson House Studio), Italy (Sand & Birch Studio) and Lithuania (JSC AKADAS).

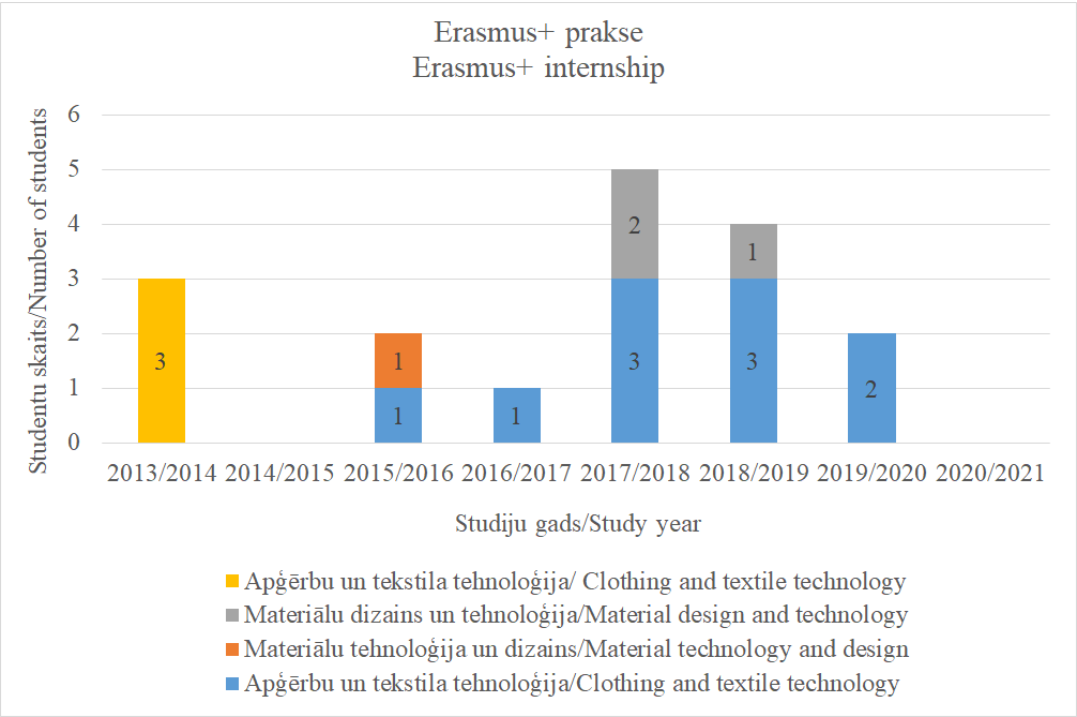


Figure 5.3. Outgoing mobility, internship

Statistics data on the outgoing mobility of students are presented in Annex 11.

During the reporting period, 9 doctoral students have visited IDT within the Erasmus+ and other funds. The dynamics of the number of incoming students by year are shown in Figure 5.1.

Information regarding the involvement of foreign academic staff in the study field “Manufacture and Processing” is presented under Paragraph 3.6 of the report.

It should be emphasised that during the reporting period, within the framework of project SAM

"Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas" (8.2.2.0/18/A/017), 3 foreign academic staff members from the cooperation higher education institutions of Lithuania and Portugal were involved in the implementation of the Bachelor, Master and Ph.D. study program “Clothing and Textile Technology” and the Bachelor study program “Materials Technology and Design”. Each of the members of the academic staff worked in the study field for 6 months. One of the academic staff members continued working in the study field for 6 months more and, as a result of successful cooperation, is still conducting particular study courses in the study programs of the study direction. The statistic data on foreign academic staff mobility is presented in Annex 10.

5.3. In the event that the study programme entails a traineeship, provide a description of the traineeship options offered to the students, as well as the provision, and work organisation. Specify whether the higher education institution/ college provides assistance in finding traineeships.

Appendix "Description of the organisation of the traineeship of the students" provides the Senate resolution on the Internship management procedure at RTU, which was revised in 2019. It states that the internship coordinator at an organizational unit helps students find the internship place. If additional assistance is required, students can contact the Career Support and Services Unit, where a career consultant and project manager assist students in finding and addressing companies where to undergo internship, as well as promote the development of career management skills through a variety of activities that can ensure the achievement of successful results during the internship. Once a year, the Career Support and Services Unit organizes RTU Career Day, where students also have the opportunity to meet face-to-face with company representatives and discuss future opportunities. More information about the event and participants of the previous years is available at https://www.rtu.lv/en/studentservice/career-centre/career-day. In 2021, due to the pandemic, the event is planned as virtual.

An additional resource developed in 2015 is a website that invites companies to post vacancies that are relevant to RTU students (https://ekarjera.rtu.lv/, in Latvian). Students have the opportunity to log in with the University username and keep abreast of current internships and job opportunities in their field.

RTU Development Fund provides additional support for practical skills promotion (https://www.rtu.lv/en/developmentfund). Hundreds of practical skills competitions are offered during the year, which are organized in cooperation with companies.

Each year, the University concludes cooperation agreements with companies and organizations (template in English is in the file of Appendix 37 of the list of Internal regulations), where the parties agree on the provision of internship places to students.

The internship is included in three study programs of the study direction: the professional Bachelor's study programs “Clothing and Textile Technology”, “Materials Technology and Design” and “Design Engineering”. The RTU Regulations on the Procedure of the organisation of the internship are attached in Annex 12. The higher education institution, in cooperation with employers, offers internship possibilities for every student. Agreements on the internship possibilities for students are concluded with 36 undertakings (see: Annex 9).

The students of the specialisations of the clothing and textile technology do their

internship in the following undertakings: Spectre Latvia SIA, New Rosme SIA, Fristads Kansas Production SIA, Brasa SRC, Lauma Lingerie A/S, 66 North Baltic SIA, Solutions SIA, Artex Latvia SIA, Nybo Dobele SIA, Printful Latvia SIA, Snickers Production Latvia SIA, Catamaran Sports SIA, Aspect SIA, Valmieras Stiklašķiedra A/S, Label Pro SIA, Lauma Fabrics LSEZ, Limbažu tīne SIA, etc.

The students of specialisations of the materials technology and design have done their internship in 23 manufacturing and design undertakings: four clothing and textile industry undertakings (ASPECT SIA - manufacturing of personalised sports clothing, and Thread Solutions SIA - materials of the textile industry, OWA – clothing with sublimation printing technique, Mans peldkostīms SIA - a social undertaking, sewing of textile products, sewing of swimwear from environmentally friendly materials); five interior design undertakings (Rīgas Interjeri SIA - building, design and cargo transportation, A Dizains un arhitektūra, Kroks LDU SIA, Fullhouse SIA); nine furniture design, manufacturing and sale undertakings (Marks M SIA(Nakts mēbeles), Bend It SIA, Colombinicasa Latvija SIA, Lāma SIA, AM Furnitūra SIA, MD Noass SIA, NORD MOOD SIA, THOMSON Furniture, Latvijas Finieris; two undertakings of design, manufacturing and construction of active recreation zones (Jūrmalas Mežaparki SIA, We Build Parks SIA) and three design undertakings, departments (Korporatīvais dizains SIA, RTU Dizaina fabrika, VG Kvadra Pak AS).

5.4. In the event that joint study programmes are implemented in the study direction, provide the justification of the creation of the joint study programmes and a description and assessment of the selection of the partnering higher education institutions by including information on the principles and the procedures for the creation and implementation of these joint study programmes. In the event that no joint study programmes are implemented in the study direction, provide a description and assessment of the plans of the higher education institution/ college for the creation of such study programmes within the study direction.
(Not applicable)

II - Description of the Study Direction (6. Implementation of the Recommendations Received During the Previous Assessment Procedures)

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 direction, 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 direction and the relevant study programmes.

The preceding assessment of the study field " Manufacture and Processing" took place in 2012, when the experts' report on the assessment of the study field was signed on 19.04.2012. The study field was accredited by resolution No. 76 of the meeting of the Study Accreditation Commission on 31 May 2013.

The experts' report on the assessment of the study field contained several recommendations that were taken into account and implemented for the development of the study direction:

- Various methodological activities are organised for **improvement of the didactic concept of the study program considering the needs of students**. This includes student surveys in the middle and at the end of the semester about every study course, creation of a self-driven study process, the versions of the structure of lectures are diversified by using the e-environment and technologies. The study programs are targeted at the study learning outcomes by emphasising the involvement of students in projects, in the acquisition of practice-based knowledge. The results of study projects are presented within the university and outside it every year by organising exhibitions and demonstrations of the students' work. At the same time, professors regularly improve their qualifications and supplement their theory knowledge, and new professors master the skills of development of the didactic model of acquisition the content of the study course by selecting the methods of evaluation of learning achievements in compliance with the envisaged learning outcomes.
- As regarding modern study methods and accessibility of e-training, thanks to the unified study and communication portal ORTUS introduced at RTU and continuously developed - the **necessary personal e-communication with students has been attained.** Opportunities offered by ORTUS are actively used in all the study courses by posting study materials and assignments there. Submission of completed assignments and their evaluation is also provided in ORTUS environment. It is also possible to arrange a Zoom conference for conducting remote lectures and consultations in ORTUS and this is actively used. There is also the possibility to apply for consultations and to communicate with the academic staff directly from the e-site of the relevant study course. The platform MS Office Teams is also used in study courses. Remote lectures on MS OfficeTeams and ZOOM platforms are recorded. Video files are posted to ORTUS environment under the relevant study course and are accessible to students for watching multiple times.
- The **training of the academic staff on modern teaching methods has been expanded and the knowledge of English of the academic staff has been improved**. Thanks to the Academic Excellence Centre (AEC) established at RTU at the end of 2018, the number of various seminars organised by RTU has increased and the academic staff has had opportunities to improve their qualification in both pedagogy and language skills. The study field has attracted the funds of the ESF SAM 2.2.2 project "Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas". Within the project, 12 members of the academic staff have improved their professional qualifications by going on an internship to the industry companies. 15 members of the academic staff have improved their skills of English and received certificates of corresponding levels.
- In RTU **there is the internal quality management system** in compliance with the new updated RTU Quality Policy approved on 25 September 2017 by the meeting of the RTU Senate, Minutes No. 612 (see: RTU Quality Policy) and the RTU Excellence Approach approved on 30 January 2017 by the meeting of the RTU Senate, Minutes No. 606 (see: RTU Excellence Approach). As the study field is one of the 12 study directions implemented by RTU, the internal quality system of the direction fully conforms with the quality system established by RTU. The report on the improvement of the study field reflecting the main changes and assessing the quality of the study process is prepared every year for providing the quality of studies. Within the study programs, the internal quality is ensured by the directors of the study programs and the academic staff implementing the study program. Control of the internal quality on the level of the study program is performed by the administration of the institute and departments. In order to secure continuous development of study programs, the Commission of the Study Program supervises academic activities in the relevant study field and is responsible for the content and quality of the study programs of the study direction. There are 4 employers' representatives in the Commission.
- **Students are involved in the assessment of the study quality - RTU has introduced**

a unified portal of studies and communication ORTUS, where every student can provide his or her assessment of the implementation of each study course twice during every semester and the whole study program at the completion of studies, by filling survey questionnaires. They are analysed regularly at the meetings of departments and the institute. The academic staff implements changes and improvements in the study process according to the students' assessment. Any implemented changes are notified to students.

- **Development of the research career of the personnel outside the university** is only envisaged for the new Ph.D. holders - Post Doctoral personnel of the study direction, who can receive financial support for up to three years from the European Regional Development Fund for the development of their research capacity and career. Two "PostDoc" projects are used during the reporting period and which them young scientists continue the development of their research work also outside the university. The scientific staff of RTU is offered opportunities to apply in tenders of scientific cooperation projects of various countries.
- Implementation of study programs in English has been started for **attaining the financial stability** of the study direction, improvement of competition and attraction of foreign students. The professional Bachelor's study program "Clothing and Textile Technology" has been implemented in English from the academic year 2018/2019. The professional Master's study program "Design Engineering" has been developed and licensed for implementation in English in 2020.
- The recommendation regarding **joint study programs**. At present Erasmus Mundus project for the development of joint Master study programs (Erasmus Mundus Joint Masters) is being prepared for the Erasmus+ 2021-2027 call, where it is planned to develop a joint Master level study program in cooperation with the University of Belgrade in Serbia, the Southern Federal University in Russia and University of Genoa in Italy.

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

During the reporting period, on the basis of the joint conclusion of the expert commission (31.03.2020) and resolution of the Study Quality Committee meeting No. 2020/15 L of 14 April 2020, the professional Master study program "Design Engineering" was licensed (code 47548). Licence No. 04051-179/2020 of 27.04.2020.

The report on the implementation of recommendations for the study program "Design Engineering" is attached in Annex "Recommendations implementation report".

Annexes

I. Information on the Higher Education Institution/ College		
List of the governing regulatory enactments and regulations of the higher education institution/ college	List of the main internal normative acts and regulations.zip	Galveno normativo aktu saraksts.zip
Information on the implementation of the study direction in the branches of the higher education institution/ college (if applicable)		
Management structure of the higher education institution/ college	2_attachment_RTU_MANAGEMENT_STRUCTURE.pdf	2_pielikums_RTU_PARVALDIBAS_STRUKTURA.pdf
II. Description of the Study Direction - 1. Management of the Study Direction		
Plan for the development of the study direction (if applicable)	Annex_3_Development_plan_of_study_field.pdf	3_pielikums_Studiju_virziena_attistibas_plans.pdf
Management structure of the study direction	4_attachment_RTU_Study_Direction_Management_Structure.pdf	4_pielikums_RTU_studiju_virziena_parvaldibas_struktura.pdf
II. Description of the Study Direction - 3. Resources and Provision of the Study Direction		
Basic information on the teaching staff involved in the implementation of the study direction	Macibspeki_Teaching_staff.xlsx	Macibspeki_Teaching_staff.xlsx
Biographies of the teaching staff members (in Europass Curriculum Vitae format)	Annex_6_Biography_of_teaching_staff.zip	6_pielikums_Macibspeku_biografijas.zip
Summary of the statistical data on the incoming and outgoing mobility of the teaching staff over the reporting period	7_attachment_MOBILITY_OF_TEACHING_STAFF.pdf	7_pielikums_MACIBSPEKU_MOBILITATE.pdf
II. Description of the Study Direction - 4. Scientific Research and Artistic Creation		
List of the publications, patents, and artistic creations of the teaching staff over the reporting period	8_pielikums_Publikacijas_makslinieciska_jaunrade_Annex_8_Publications_Creative_work.zip	8_pielikums_Publikacijas_makslinieciska_jaunrade_Annex_8_Publications_Creative_work.zip
II. Description of the Study Direction - 5. Cooperation and Internationalisation		
List of cooperation agreements	9_attachment_List_of_Corporate_agreements_ENG.pdf	9_pielikums_Sadarbibas_ligumu_saraksts_LV.pdf
Statistical data on the teaching staff and the students from abroad	Annex_10_Statistical_Data_on_Foreign_Students_and_Teaching_Staff.pdf	10_pielikums_STATISTIKAS_DATI_ARVALSTU_STUDEJOSIE_MACIBSPEKI.pdf
Statistical data on the mobility of students (by specifying the study programmes)	11_attachment_Statistics_on_Students_Mobility.pdf	11_pielikums_STATISTIKAS_DATI_PAR_STUDEJOSO_MOBILITATI.pdf
Description of the organisation of the traineeship of the students	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
Information on the agreements and other documents confirming the traineeship of the students in companies	List-of-Internship-provision-in-companies.pdf	Prakses-nodrosinajums-uznemumos.pdf
II. Description of the Study Direction - 6. Implementation of the Recommendations Received During the Previous Assessment Procedures		
Overview of the implementation of the provided recommendations	Recommendation_Implementation_Report.pdf	Rekomendaciju_izpildes_parskats.pdf
Description of the Study Programme - Other mandatory attachments		
Confirmation signed by the rector, director or the head of the study programme or the study direction of the higher education institution/ college which states that the official language proficiency of the teaching staff involved in the implementation of the relevant study programmes of the study direction complies with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.	02000-2.2.1-e_95 - valsts valodas prasme.edoc	02000-2.2.1-e_95 - valsts valodas prasme.edoc
III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	5.pielikums_Statistikas_dati_par_studejosajiem_ANNEX_5_Statistics_on_students.docx	1_pielikums_Statistika_par_studejosajiem_LV.docx
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of 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 (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		
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 Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.		
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued		
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme		
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.		
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education		
Sample (or samples) of the study agreement		
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.		

Description of the Study Direction - Other mandatory attachments		
Electronically signed application form for assessment of a study direction	Iesniegums_novērtēšanai - 01000-2.2.1-e_144.edoc	Iesniegums_novērtēšanai - 01000-2.2.1-e_144.edoc

Other annexes

Name of document	Document
Studiju virziena finansējums / Financing of the Study Field	Financing_of_Study_Field.pdf
ESG_standartu_integresanas_raksturojums.pdf	ESG_standartu_integresanas_raksturojums.pdf
ESG_standards_integration_description.pdf	ESG_standards_integration_description.pdf
RTU IT sistemu saskarnes.zip	RTU IT sistemu saskarnes.zip
Screenshots of RTU IT systems.zip	Screenshots of RTU IT systems.zip
2. RTU Senata lemuma noraksts.pdf	2. RTU Senata lemuma noraksts.pdf
3. Macibspeku saraksts.xlsx	3. Macibspeku saraksts.xlsx
4. Studiju programmas planojums.pdf	4. Studiju programmas planojums.pdf
5. Studiju programmas parametri un varianti.pdf	5. Studiju programmas parametri un varianti.pdf
6. Bibliotekas resursi.pdf	6. Bibliotekas resursi.pdf
174790.pdf	174790.pdf
174790_EN.pdf	174790_EN.pdf
175045.pdf	175045.pdf
E-signed documents.7z	E-signed documents.7z

Clothing and Textile Technology (42542)

Study field	*Manufacture and Processing*
ProcedureStudyProgram.Name	*Clothing and Textile Technology*
Education classification code	*42542*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Inese*
Surname of the study programme director	*Ziemele*
E-mail of the study programme director	*Inese.Ziemele@rtu.lv*
Title of the study programme director	*Dr. sc. ing.*
Phone of the study programme director	*+37126131751*
Goal of the study programme	*The goal of the study programme is to train highly qualified engineers of the LQF level 6 for the textile and clothing industry - specialists in textile technologies, clothing technologies and clothing construction, familiar with the basics of modern technologies and specialised design methods, providing students with engineering training and basics of materials science in the textile and clothing technology sub-sector, as well as creating a basis for further studies to acquire a higher level of knowledge and competence.*
Tasks of the study programme	*Objectives of the study programme:* *- to train competitive professionals demanded on the labour market of the textile and clothing manufacturing industry;* *- to implement a study programme, which covers various areas related to different textile and clothing technologies, to provide an opportunity for students to learn engineering basics, to become familiar with technologies of design and production of textile and clothing;* *- to train production engineers with a broad perspective, able to independently perform creative work in an area of the textile industry;* *- to develop the abilities of students to independently analyse and solve particular product design tasks and assignments related to the design, organisation, management of manufacturing companies and provision of the quality of production;* *- to develop the abilities of students to independently solve practical tasks related to textile and clothing production technological processes and their construction, management and organisation by working both individually and within a team;* *- to provide necessary knowledge and to develop the abilities of sustainable working both in manufacturing at undertakings related to the textile industry (fashion business, trade, etc.) and continuing studies on the Master's level.*

Results of the study programme	*Graduates of the study programme:* *- understand the design of textiles and textile products or the design, construction and cutting of clothing and the application of the used methods and materials;* *- are familiar with the concepts of improvement of the technological processes of manufacturing of textiles, textile products or clothing, their development and introduction methods, the methods of the work time planning, work organisation and control, use of technological equipment;* *- understand development of new products and manufacturing technologies, the most recent industry trends, innovations and methods, the requirements of the national and EU laws and regulations governing the industry and their changes;* *- are able to independently design textiles, textile products or clothing constructions, including by using computer aided design systems, as well as to develop proposals for purchase of needed raw materials for industrial manufacturing of new design products;* *- are able to develop and plan manufacturing technological processes, to make their adjustments, to design the sequence of performance of processes, to develop the equipment service and work instructions in industrial manufacturing, to develop standards of the work time, to define the layout of the flow, to adopt decisions on needed adjustments in non-standard situations;* *- are able to work in a team for development of introduction of new products in manufacturing and to develop new technological processes, to define the product quality criteria, to implement the quality control of production;* *- are able to plan, organise and provide performance of the manufacturing of textile, textile products or sewn products in compliance with the work assignment, the quality and time requirements, the customer's and/ or client's needs and to assume responsibility for the results of the works performed by oneself and/ or the team;* *- are able to introduce and organise the quality control processes and the requirements for providing the product quality by ensuring and supervising compliance with the quality and labour safety, electrical safety, fire safety and ergonomics, and developing recommendations for changing the requirements;* *- are able to analyse information about the development trends and standards of the textile industry, to recommend and introduce new methods of construction, modelling, improving of technological processes, design, concepts, methods and their experimental models.*
Final examination upon the completion of the study programme	*The programme is completed by a State Examination where the defence of the Bachelor's thesis is one of the components.*

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)	*General or vocational secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Bachelor Degree in Clothing and Textile Technology*
Qualification to be obtained (in english)	*Engineer in Clothing and Textile Production*

Places of implementation

Place name	City	Address
Riga Technical University	RĪGA	KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050

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)	*General or vocational secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Bachelor Degree in Clothing and Textile Technology*
Qualification to be obtained (in english)	*Engineer in Clothing and Textile Production*

Places of implementation

Place name	City	Address
Riga Technical University	RĪGA	KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050

III - DESCRIPTION OF THE STUDY PROGRAMME (1. Indicators Describing the Study Programme)

1.1. Description and analysis of changes in study programme parameters that have taken place since the issue of the previous accreditation certificate of study direction or the license of study programme if study programme is not included in the accreditation page of the study direction

Changes in the parameters of the study programme implemented from the issue of the preceding accreditation sheet of the study direction have not been of a large extent, still, they are important and have enabled expansion of the study programme in the international environment, attraction of additional applicants to studies in English. A summary of the changes in the parametes is provided in Table 1.1.

Table 1.1

Changes in the parameters of the study programme

No.	Parameter	Change analysis
1.	Head of the study programme	The head of the study programme was replaced due to the termination of employment (retirement) of the preceding head of the programme professor Ausma Viļumsone. associate professor Inese Ziemele, the lecturer of the study programme for many years, has been leading the study programme since February 2018. Dr.sc.ing. Inese Ziemele has compliant qualification and experience in development of the content of study programmes of the higher professional education.
2.	Goal of the study programme	It was updated in accordance with the knowledge, skills and competence of the level 6 of the Latvian Qualification Framework (LQF) defined by the Latvian education classification and by coordinating with the description of the LQF level 6 of the industry, as well as taking into account changes in the current labour market demand and topicalities in the industry.
3.	Objectives of the study programme	Updated taking into account the requirements of the competence education, changes in the current labour market demand and topicalities in the industry.
4.	Learning outcomes to be achieved	The learning outcomes are specified in accordance with the requirements of competency based approach in education, changes in modern labour market demand and current events in the field, thus reflecting the current nature of the study programme and compliance of the study programme with LQF / EQF level 6 requirements and contemporary issues of textile and clothing technology.
5.	Type and form of studies	Admission to correspondence studies was discontinued in 2016 because there is a high drop-out rate of students.
6.	Language of implementation	By order of the Deputy Study Rector of RTU No.02000-1.1/1, dd. 07.01.2016, it is allowed to implement the study programme at the International Cooperation and Foreign Students Departement. In academic year 2018/2019 students were admitted and implementation of the study programme in English was commenced.
7.	Admission requirements	Upon starting of implementation of the study programme in English, the admission requirements were supplemented in 2018 (see the admission requirements for foreign students in English: https://international.rtu.lv/riga-technical-university-rtu/bachelors-studies/clothing-and-textile-technology-bachelors/).
8.	Qualification to be acquired	Due to the decrease of the demand, studies in the speciality of Clothing Marketing were discontinued as from 2013.

1.2. Analysis and assessment of the 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 in the different study forms, types, and languages.

The study programme “Clothing and Textile Technology” is implemented in Latvian and English in Riga. Graduates of both the general secondary education institutions and technical colleges and vocational schools, having completed the secondary education, study in the study programme in Latvian. The number of graduates has been stable over the last 8 study years and amounts to 12 graduates per year on average. Thus, this satisfies the annual demand of the undertakings of the light industry of Latvia for young engineers, amounting on average to 5 clothing designers-engineers, 5 clothing manufacturing technology engineers and 2 textile manufacturing technology engineers.

Statistics data about the students in the study programme, the development of the number of students per courses and academic years, the distribution of the number of students per types of studies and funding sources, the drop-out of students and the reasons beyond it, are attached in Annex 1.1.

The analysis of the *number of students in the report period* has led to the conclusion that the total number of students in Latvian has decreased by 28 %, in particular, from 111 students in academic year 2013/2014 to 80 students in academic year 2020/2021. The decrease of the number of students can be seen during the last 8 years and is related to the demographic situation in Latvia, changes in the demand of the modern labour market, as well as the reduction of the study places with the state budget funding. Despite the above, it can be seen that the number of students is getting stable during the last two study years. The development of the number of students indicates that 30-40 students start studying in the first year during the recent years and this corresponds to the allocated study places with the state budget funding. On average up to two thirds of admitted students continue studying after the first study year. The drop-out is comparatively high in the 1st study year following the first semester, when on average 20 students continue studying in the 2nd semester out of 30 students who started studying, in most cases this being related to weak achievement rates in the higher mathematics and physics study courses. The issues of the failing progress in the mathematics study course are resolved within RTU by introducing additional study courses in mathematics for students with weak knowledge to support students for improvement of insufficient knowledge.

The main reasons behind *drop-out of students studying in Latvian*, according to the data of the RTU study management system, on the basis of the issued orders, are failing progress of students and expulsion based on the students' application. The failing progress of students during the first study year is related to the students not being able to adapt to studies in a higher education institution following the secondary school resulting in failing progress in several study courses following the first and the second session, following by expulsion from the higher education institution. Considerably fewer students discontinue studies based on their own wish, and they refer to the inability to combine studies with employment among the reasons, as many students are employed at salaried work parallel to studies. There are cases when students do no resume studies following an academic study break or after they have many academic debts, do not start development of the Bachelor’s thesis.

The non-conformity between the number of students in the 4th year and the number of graduates in the relevant study year is related to student's academic leaves or study debts, due to which a student cannot complete studies in the relevant academic year. Academic leaves are used on average by 5-10 % of the students in the study programme. The child-birth should be referred to as the main reason because mainly female students study in the study programme. In some cases studies are temporarily suspended due to health issues.

At present the biggest part of students study at full time study places with the state budget funding, however, during the time period from study year 2013/2014 to 2017/2018 approximately 10-15 % of students paid their tuition fees by themselves. The decrease of the number of paying students can be explained by the increase of the study tuition fee from EUR 1600 in study year 2013/2014 to EUR 2800 in study year 2021.

Starting from study year 2018/2019 the study programme “Clothing and Textile Technology” is also implemented in English and offered to the students of the RTU Department of International Cooperation and Foreign Students. 3 students were admitted in the first study year (2018/2019) and one student of them continues studies in the 3rd year, 5 students were admitted in study year 2019/2020 and one student of them continues studies in the 2nd year. Students who study or studied in this study programme came from India, China, Uzbekistan, Sri Lanka and Turkmenistan.

The main reasons beyond the drop-out of students studying in English include the failing progress of students, expulsion based on the student's application and transfer to studies in another study program at RTU. It should be concluded that, like the students of the study programme in Latvian, also students in English experience problems of starting studies in the first study year resulting in failing study programs in multiple study courses following the first and the second session, followed by expulsion from the higher education institution. Male students have dropped studies or changed the study programme by their own application. Summarised information indicates that some students have not continued studies due to health issues.

Due to the low number of foreign students, the Institute of Design Technologies has adopted the decision to continue implementation of the study programme in English if minimum seven students are admitted.

1.3. Analysis and assessment of the interrelation between the name of the study programme, the degree or professional qualification to be acquired or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements.

The goals and objectives of the professional Bachelor’s study programme “Clothing and Textile Technology” conform to the level 6 of the Latvian Qualification Framework (LQF) and it is targeted for applicants possessing the general secondary education or the vocational secondary education without imposing additional admission rules.

Admission of applicants to the full time basic study programme in Latvian is done based on the results of centralised examinations (CE) in mathematics, the Latvian language, a foreign language and final grades in particular subjects in the document of the secondary education.

According to the regulations for admission of foreigners (RTU Senate meeting of October 28, 2019, Protocol No. 633), foreign applicants must pass the entrance exam in English and mathematics. Foreigners who wish to study in the Latvian language must submit a state language proficiency certificate issued by the state language proficiency examination commission. Language proficiency must be at least second level B.

The title of the study programme indicates the *goal of the study programme* - to train highly qualified engineers of the LQF level 6 for the textile and clothing industry - specialists in textile technologies, clothing technologies and clothing construction, familiar with the basics of modern technologies and specialised design methods, providing students with engineering training and

basics of materials science in the textile and clothing technology sub-sector, as well as creating a basis for further studies to acquire a higher level of knowledge and competence.

The knowledge and competence of graduates allow working in undertakings within the teams of engineering personnel, to plan, organise and provide performance of the manufacturing works of textile materials or sewn products in compliance with the work assignment, the quality and time requirements, the customer’s and client’s needs and to assume responsibility for the results of the works performed by oneself and the team.

The *objectives of the study programme are subordinated to attaining the set goal:*

- to train competitive professionals demanded on the labour market of the textile and clothing manufacturing industry;
- to implement a study programme, which covers various areas related to different textile and clothing technologies, to provide an opportunity for students to learn engineering basics, to become familiar with technologies of design and production of textile and clothing;
- to train production engineers with a broad perspective, able to independently perform creative work in an area of the textile industry;
- to develop the abilities of students to independently analyse and solve particular product design tasks and assignments related to the design, organisation, management of manufacturing companies and provision of the quality of production;
- to develop the abilities of students to independently solve practical tasks related to textile and clothing production technological processes and their construction, management and organisation by working both individually and within a team;
- to provide necessary knowledge and to develop the abilities of sustainable working both in manufacturing at undertakings related to the textile industry (fashion business, trade, etc.) and continuing studies on the Master’s level.

The content of the study programme is developed in such a way that the objectives and the learning outcomes of the study courses to be achieved would ensure achievement of the overall goal and results of the study programme. The above is confirmed by the mapping of the learning outcomes to be achieved in study courses (see in Annex 1.2). The biggest focus in the study process is on acquiring professional and practical competences based on the science achievements, theoretical knowledge and the industry specifics. The study programme is the only one in Latvia where engineering personnel for the textile industry is trained.

The Professional Bachelor's degree in Clothing and Textile Technology and the level 5 of Professional Qualification of Engineer in Clothing and Textile Production are awarded after successful completion of the study programme theoretical and practical study courses, practical placement in a manufacturing company and defense of a Bachelor's thesis to the State Examination Commission.

Thus, the mutual connection between the title of the study programme, the degree to be acquired, the goal and objectives, the learning outcomes, as well as the admission requirements is observed.

III - DESCRIPTION OF THE STUDY PROGRAMME (2. The Content of Studies and Implementation Thereof)

2.1. Assessment of the relevance of the content of the study course/ module and the

compliance with the needs of the relevant industry and labour market and with the trends in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In 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.

The analysis of the compliance of the professional Bachelor's study programme "Clothing and Textile Technology" with the Cabinet Regulations No. 512 "Regulations regarding the State Standard for the Second-Level Professional Higher Education" adopted on 26 August 2014, it can be concluded that the content of the study programme complies with the requirements of the standard. See the comparison of the study programme to the requirements of the standard in Annex 2.1. The volume of the study programme is 160 CP consisting of study courses (128 CP), the practical placement (20 CP) and the State Examination (12 CP), where the development and defence of the Bachelor's thesis is an integral part. The study courses of the study programme, the scope and the content of study courses, as well as the content of the practical placement is developed in compliance with the Bachelor's degree to be acquired and the professional qualification according to the requirements of the standard of occupation "Engineer in Clothing and Textile Production" (see at

https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/20170614_Profesiju_standarti_5.pdf (pp. 12-15).

The study programme "Clothing and Textile Technology" is implemented by the Department of Clothing and Textile Technologies of the Institute of Design Technologies (IDT) of the Faculty of Materials Science and Applied Chemistry (FMSAC). Six other faculties of RTU, their institutes and departments are also involved in implementation of the study programme.

The content of the study programme is continuously updated and improved according to the recent trends in the textile industry, as well as the situation on the labour market and its requirements. Changes are discussed and approved in the committee of the study direction "Manufacture and Processing" and submitted for approval to the Council of FMSAC. In compliance with the RTU "Procedure of application, development and amending study programs", they are further approved by the RTU Study Department or the RTU Senate. The academic staff of the study programme considers topicalities in the national economy of Latvia and globally in updating and implementation of their study courses and reflect them in the content of the study courses. Also students participate in improvement of the study content by filling in surveys on the portal ORTUS every semester and evaluating the content of the study courses completed during the relevant semester and the quality of their implementation.

IDT regularly receives information about the skills, knowledge and competence important for the labour market from the heads of undertakings of the Latvian textile industry, the Latvian Association of the Light Industry Enterprises (ALIE), the representatives of the State Examination Commission and colleagues, who are invited members of the Council of Experts of the Textile Products, Clothing, Leather and Leather Products Manufacturing Industry of the Employers' Confederation of Latvia.

The most important professional knowledge, skills and competences expected by employers from the young professionals employed in the professions in the industry having acquired the professional higher education include the ability to follow up and analyse the global trends in the

industry; identification of new markets; attraction of new customers; development of new products and their introduction in manufacturing; development of proposals for development of the undertaking. Special focus is put on development of these abilities of students in the study process.

In 2016, in compliance with decision of the RTU Senate No. 288 “On uniform requirements of RTU in study programmes”, the module of 6 CP “Innovative Product Development and Entrepreneurship” was incorporated in the study programme, its content covers the competences of business, transfer of technologies and product development. The study methodology is based on joint creation, integration of the parties involved in development of new products and commercialisation in the study process, provision of continuous feedback on the results of the group work of the students involved in the study process and their achievements. It is targeted at learning by doing and development of integrated theoretical knowledge. The goal of the study module is to systematise and deepen knowledge on matters of development of new products, transfer of technologies, innovation and commercialisation of their results, as well as business, to enable students to use acquired knowledge, skills and methods in work situations and their professional development upon starting business and establishing their undertakings, as well as leading the team work. The objective of the study module is to develop students’ competence in development of new products and transfer of technologies, to develop the business skills and their application in practice, at the same time encouraging development of the overall creation and planning skills, as well as the skills of presenting individual ideas. By making changes, the study courses “Economics of Manufacturing and Sale Apparel”, “Chemistry for Engineers ” were excluded from the study programme and the study course “Textile and Clothing Research Methods ” was introduced as the replacement of the basic research study courses delivered separately for different specialisations “Methods and Facilities for Research” and “Clothing research methods”.

In order to enable the youth having acquired the secondary education to make more substantiated choice of the specialisation and to get broader knowledge of the selected field in the first study year, the volume of practical placement was reduced from 26 CP to 20 CP and two new study courses “Fundamentals of Garment Patternmaking and Technology” and “Basic Principles of Textile Technologies”, allowing getting knowledge of the basic processes in specialisations in the beginning stage of the studies, were introduced in the study programme in the part of the compulsory professional specialisation courses.

Also in 2016, based on the opinion of the lecturers of the study programme, students and employers that a necessity has emerged for modern study courses about technical textiles and new clothing materials, provision of their quality and further development of application, as well as based on objections that the structure of the mathematics study courses and their total volume are not satisfactory, changes were made to improve the content of quality of the study program. The previously implemented study course “Sourcing of Clothing Materials” was replaced with uniform courses for specialisations “Clothing Material Development” and “Technical textiles”. The volume of mathematics study courses was reduced from 13 CP to 7 CP, and following the change, they consist now of the study courses “Mathematics” of 5 CP and “Probability Theory and Mathematical Statistics” of 2 CP. The study course common for specialisations “Fundamentals of Fine Arts”, which is needed for design of clothing and textile products and development of their collections, was also included in the study programme. During this period, the volume of study projects to be completed for professional specialisations was changed from 6 CP to 8 CP. In 2019 the study course “Production of Nonwovens”, which has become particularly topical due to development and extensive use of the technologies of processing of textile waste, was introduced in the study programme.

In 2017, based on resolution of the RTU Senate No. 608, the study course “Sport Activity” was excluded from Part A of the study programme, and this is substantiated by “RTU Sport Activities

Development Concept 2017 – 2020". Students can still choose this course as a free elective study course of 2 CP.

In order to ensure that the study programme conforms to the requirements of the content of study courses defined by the Environmental Protection Law and the Civil Protection and Disaster Management Law, the study course "Environment and Climate Roadmap" of 1 CP was introduced in the study programme as a replacement of the study course "Basics of Occupational Safety" in 2020.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In 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.

Nine learning outcomes to be achieved are defined for the professional Bachelor's study programme "Clothing and Textile Technology". The study programme is targeted at attaining its goal from the point of view of its structure and content. The goal of the study programme is closely linked with the defined learning outcomes of the study programme, which should be achieved during acquisition of the study courses. Study courses are mutually linked and supplement each other to achieve the planned outcomes of the study programme. This link between study courses and the study results of the study programme is reflected by the mapping of the study courses (see Annex 1.2). A certain sequence is followed in planning implementation of study courses for successful attaining of the study programme results. The study process provides progressing from general study courses of the higher education and the study courses of the basics of the industry materials and technologies to more complicated technologies, computer aided design of products, design and organisation of manufacturing processes. The plan of implementation of the study programme is attached in Annex 2.2.

In compliance with Cabinet Regulations No. 512 "Regulations regarding the State Standard for the Second-Level Professional Higher Education" (adopted on 26 August 2014), the goal of the professional Bachelor's study programme provides that the professional qualification of level 5 is awarded to the graduate following its successful completion.

The interconnection of the competencies to be acquired in the study courses of the study programme and their compliance with the competencies specified in the Standard of Occupation "Clothing and Textile Production Engineer" is confirmed by the conformity assessment of the study courses (see Appendix 2.3).

Descriptions of study courses are collected in the uniform RTU Register of Study Courses and attached in Annex 2.4. The collection contains descriptions of 33 compulsory study courses (Part A), descriptions of 42 limited choice study courses (Part B), description of internship (Part D) and description of the final examination (Part E).

2.3. Assessment of the study implementation methods (including the evaluation methods) by providing the analysis of how the study implementation methods (including the

evaluation methods) used in the study courses/ modules are selected, what they are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

The study process is organised in the form of lectures, laboratory assignments and practical assignments to provide both theoretical and practical knowledge to students. *Various study methods* are employed: lectures, seminars, presentation, group work, discussions, case studies, solving of practical assignments for enforcement of knowledge and tests for checking of knowledge. Assignments of a higher degree of difficulty are offered according to the background level of students.

In order to inform students about the latest trends in the industry, there are regular guest lectures by industry experts and company representatives (for example, a lecture by the head of the Association of Light Industry Enterprises Guntis Strazds to 1st year students on the textile industry and its development trends). Also, study excursions are organized for students to manufacturing companies - New Rosme, Rita, Spectre Latvia, Fristads Kansas Production, Solutions, etc., as well as to textile production companies - Klippan Saule, Limbažu Tīne, Valmiera Glass, etc. In companies, academic staff together with company employees provide in-depth information on technological processes and production issues.

Every study year students have had an opportunity to listen to guest lectures by foreign academic staff and researchers, for instance, in 2013 the lecture “Standardised leather control methods” by the guest lecturer from Kaunas University of Technology (KTU); in 2014 the lecture “Perspectives of the textile industry in Europe and globally” by the guest lecturer of KTU; in 2015 the lecture “Research of the diverse world of textile materials” by the guest lecturer of Niederhain University of Applied Sciences; in 2016 the lectures “Achievements in development and application of innovative fibre, yarn, fabric structures” and “Fibre materials for smart environment” by two guest lecturers of KTU, the lecture “Organisation of clothing manufacturing” by the guest lecturer from Minho University (Portugal); in 2017 the lecture “LEAN methods in clothing manufacturing and their efficiency” by the guest lecturer of Ege University (Turkey) and the lecturer “Integration of smart textile in workwear, virtualisation and definition of the fit table” by the guest lecturer of Vilnius University of Applied Sciences (Lithuania); in 2018 the lecture “Style underwear in the 20th century” by the guest lecturer of University De Montfort (UK), etc.

Big emphasis is placed on changing the style of studying to “learning to learn”, therefore the individual and group research work is widely used. By implementing various group work assignments, students are directed to development of independence, increase of responsibility and encouragement of mutual respect. The business role plays, which is a less extensively used teaching method, is also used in the study process, they encourage involvement of students in the study process and promote creativity. For example, within the scope of implementation of the study courses “Innovative Product Development and Entrepreneurship ”, “The Development of Industrial Clothing Collections”, students work in groups and develop a joint project, thus helping each other to develop various skills. This is how students improve their communication, presentation and analysis skills, as well as the ability of respecting the opinion of their coursemates.

Starting from the 1st year, the interest of the research work is encouraged and students' competences in this area are developed. Students are invited to participate in the annual RTU Scientific Conference of Students in the IDT sub-section “Design Technologies” (see https://www.rtu.lv/lv/rtusp/sp-projekti/akademiskie-un-zinatniskie-projekti/studentu-zinatniski-tehnis

ka-konference). Several students of the 4th year of the study programme “Clothing and Textile Technology” recommended by the lecturers of IDT by their assessment participate in the scientific conference of students. Students’ research skills and the objective information analysis skills are developed during development of study projects and graduation papers, as students work with data bases in the RTU uniform study management portal ORTUS by selecting necessary information and analysing scientific articles, in the RTU library resources (including e-resources). Students’ skills to process statistics data are also strengthened.

Assessment of study results is done in compliance with Senate of RTU decision of 29 May 2017 (Minutes No. 610) "Regulation on the Assessment of Learning Outcomes”. The *cumulative assessment system is applied* for the final assessment of study courses, where the final grade consists of several components (completion of practical assignments or laboratory assignments; results of interim tests; the quality of presentations and reports; the examination grade, etc.), in the result of which the student’s grade is affected by the student’s performance during the semester.

The *forms, terms and requirements of interim tests and final tests are explained to students* in the first lecture of the study course and published in ORTUS (Moodle) system under descriptions of study courses and on the sites of study courses. Requirements for completion of study courses, development of study papers and the Bachelor's thesis can be found in descriptions of study courses and papers. They are not changed during the semester. The requirements contain information on the compulsory attendance of classes, tests that will be taken into account in the final assessment of the examination of the study course, as well as general information on the final examination of the study course. There are tests in every study course (where the volume is minimum 2 CP) - tests, laboratory assignments, practical assignments and study papers, as well as other forms of examination of knowledge suitable for the specifics of the study course, by which the *knowledge of each student is tested based on the equal criteria applied to all the students in the study course.*

A particular weight is assigned to the independent assignments, tests, reports, presentations and other assignments completed during the semester in the final grade. The grade of the examination does not exceed 50% of the final grade (in compliance with the resolution of the RTU Senate).

Students *may appeal against the assessments of study results* - this is provided for by RTU Rules of assessment of study results (resolution of the Senate of 29.05.2017, Minutes No. 610).

Lecturers prepare the structure of assessment for every study course they deliver. The approach when the academic staff provides an opportunity for students to earn additional points by solving small tasks and performing case studies on the reviewed topic to encourage attendance of classes and to ensure continuous testing of knowledge, can be mentioned as an example thereof. Points earned during the semester are taken into account in the final grade of the study course. Every student can submit text and graphic individual and group assignments and their reports in due time on the ORTUS site of every study course and receive the professor’s comments, corrections and grade at the same place.

The lecturer’s initiative to present an opportunity for students to write questions to which a student would like to receive an answer or explanation before the examination in a shared document (by using Docs Google tool) before the exam consultation at the end of the semester can be mentioned as another example. An answer can be provided not only by the professor, but also other students. This allows students to prepare better for the examination, as not all the students dare to ask questions during a consultation before an examination, however, when they can do it in writing anonymously, they can clarify more. Preparations prior to an exam organised in the above way allow the lecturer to better help students to prepare for the final examination and to identify the problematic topics of the study course where more attention should be paid in future.

All the lecturers have weekly consultations of minimum 2 academic lessors, where students *can communicate individually with professors* and to receive answers to questions they are interested in.

The results of assessment of the knowledge of the students of the professional Bachelor's programme "Clothing and Textile Technology" are discussed at the meetings of the Department of Clothing and Textile Technologies (DCTT) twice a year following the session. The progress of graduation projects of the 4th year students is also assessed every month where the academic staff of the department work individually with every student. Results are summarised and assessed also by the administration of the study program. Along with the results of student surveys they serve as the basis for further improvement of the study process.

The analysis of the methods of implementation of studies and assessment of results applied in the study programme allows concluding that the principles of student-focused education are consistently followed:

- the diversity of students and their needs is taken into account and respected by creating appropriate ways of learning;
- various forms of implementation of the study programme are used;
- according to students' abilities and needs, the academic staff applies diverse teaching methods and encourage a student's willingness to be independent, at the same time providing the leadership and support by the academic staff;
- the process of a studies promotes mutual respect in the relationship of students and the academic staff because the principle of democracy is followed and the administration of the study program takes into account the students' opinion.

The organisation and quality of the students' assessment system is very important in implementation of student-focused education. The analysis and assessment of this system within the particular study program leads to the conclusion that:

- the assessment methods and criteria for deciding on grades are published in advance on RTU portal ORTUS;
- the lecturers present the methods and criteria of assessment of the level of acquisition of the study courses upon starting a study course and the students are well aware of these conditions;
- assessment is consistent, fair, suitable for all students and is implemented in compliance with approved procedures;
- assessment reflects achieved study results and students have an opportunity to receive feedback;
- the academic staff continuously improves their teaching skills at academic conferences and seminars in order to improve the teaching methods and assessment of the results of studies.

The main form of self-assessment of the study process and results of the study programme is meetings of the department held once a month and possibly combined with workshops on development of the Bachelor thesis - interim shows. Workshops on development of the Bachelor thesis are arranged for the students of the 4th year minimum three times during the semester to discuss the progress of the Bachelor thesis. At these workshops students present the developed parts of the Bachelor's thesis, there are discussions about the completed work, the academic staff presents recommendations for continuing the work, also students share they experience of the process of development of the graduation papers. By discussing the progress and quality of development of the Bachelor thesis, proposals are expressed regarding desirable changes in the study program or individual study courses.

Defence of the Bachelor's thesis to the State Examination Commission, including representation of heads of the manufacturing undertakings of the industry, should be mentioned as the second form of self-assessment of the study process of the study programme and its results. Thus, immediate feedback is received from the industry representatives regarding the preparation of students for working in the manufacturing, and there is also additional exchange of thoughts about the current needs of the industry as regards training of young professionals and correspondence of the study program for this purpose. Not only the representatives of the undertakings assigned to the State Examination Commission, but also manufacturers who are interested to attract young professionals to their undertakings, are invited to the defence procedure. During discussion of the results of defence of graduation papers, manufacturers are particularly asked to assess the topicality of the themes of the students' projects, to point out deficiencies and to propose perspective directions of research or practical elaborations.

2.4. If the study programme entails a traineeship, provide the analysis and assessment of the relation between the tasks of the traineeship included in the study programme and the learning outcomes of the study programme. Specify how the higher education institution/ college supports the students within the study programme regarding the fulfilment of the tasks set for students during the traineeship.

In compliance with Cabinet Regulations No. 512 "Regulations regarding the State Standard for the Second-Level Professional Higher Education Regulations on the national standard of the second level professional higher education" (adopted on 26 August 2014), compulsory internship / practical placement of 20 CP is provided within the professional Bachelor's programme for students to acquire practical skills and to join the labour market following their studies better.

Until 1 July 2019 the practical placement was implemented in compliance with the regulations approved by the Senate of RTU on 29 March 2010, and from 2019 it is done in compliance with the Resolution of the Senate of RTU of 28 January 2019 (Minutes No. 626) and according to the regulations of the structural unit implementing the study programme. The description of practical placement is included in the RTU Register of Study Courses (Annex 2.4). The description presents the goal, the main objectives of the practical placement and the main outcomes to be achieved.

The goal, tasks and planned learnig outcomes of the practical placement are related to the overall goal of the study programme and the learning outcomes to be achieved within the study process which can be seen in the mapping of study courses (Annex 1.2). For example, planned learnig practical placement outcome „Is able to choose sequence of textile fabric or apparel production" corresponds to the following learning outcomes to be achieved in the programme: „Understand the design of textiles and textile products or the design, construction and cutting of clothing and the application of the used methods and materials", „Are able to independently design textiles, textile products or clothing constructions, including by using computer aided design systems, as well as to develop proposals for purchase of needed raw materials for industrial manufacturing of new design products", „Are able to develop and plan manufacturing technological processes, to make their adjustments, to design the sequence of performance of processes, to develop the equipment service and work instructions in industrial manufacturing, to develop standards of the work time, to define the layout of the flow, to adopt decisions on needed adjustments in non-standard situations".

In addition to the description of the practical placement, Departement of Clothing and Textile Technologies (DCTT) has also developed the Methodological Guidelines on Practical Placement. The

practical placement process is coordinated by a coordinator assigned by the higher education institution and managed by a manager assigned by the practical placement venue.

Students' practical placement is organised in two parts. The first part of the practical placement of 9 CP is provided to students led by the practical training academic staff in the IDT training workshops. During the practical placement, led by highly qualified academic staff, students perform practical assignments in the relevant workshops of the institute by learning the possibilities of use of materials and tools, safe working methods and basic skills of production of products. The practical placement assessment is based on the work performed by students, prepared interim reports and the assessment of every 6 months assessed by several academic staff members.

The second part of practical placement of 11 CP is performed at manufacturing companies. Before students perform practical placement at companies, the study courses of textile and clothing technologies, manufacturing equipment and specialised design IT programs, as well as the basic working skills in production of clothing and textile products are acquired. Practical placement is individually supervised for every student by the practical placement coordinator or the supervisor. The structural unit provides/ approves a place of practical placement in compliance with the programme requirements within the implementation of the practical placement. If a student selects a place for practical placement independently, it needs to be approved by the practical placement coordinator. The structural unit, the place of practical placement and the student sign a tripartite agreement providing for all the obligations, rights and responsibility of the parties. During practical placement at a manufacturing company, the student collects information about the company and manufacturing processes on the basis of the theoretical knowledge, as well as performs the duties suitable for the junior engineering personnel, thus strengthening work skills by using industrial machinery. As the second part of practical placement is performed at a manufacturing company in the 4th year, in parallel to development of the graduation paper, this provides a good opportunity to link the practical placement with the theme of the Bachelor's thesis and to obtain information necessary for elaboration of the topic, as well as to receive professional assessment of developments.

The practical placement for foreign students is the same as for Latvian students. A foreign student can choose an practical placement place in Latvia, abroad, or in his / her home country. If the practical placement is selected to be in a foreign company, the practical placement coordinator evaluates the company's ability to ensure the expected learning outcomes of the study programme before concluding the contract.

83 full time students have completed practical placement at textile and clothing manufacturing companies since 2014. Practical placement venues are very varied - including clothing manufacturing companies, for instance, Spectre Latvia, New Rosme, Fristads Kansas, Brasa SRC, Lauma Lingerie, 66° North Baltic, Solutions, Artex Latvia, Nybo Dobele, Printfull Latvia, Snickers Production Latvia, Catamaran Sports, Aspect, etc.; as well as textile manufacturing companies, for instance, Valmiera Glass, Label Pro, Lauma Fabrics, Limbažu Tīne, etc.

IDT has long-term cooperation agreements (see Annex 9 of Part II of the Study Direction) regarding provision of practical placement's places with the following companies: 66 North Baltic, Aspect Brasa SRC, Fristads Kansas, Limbažu Tīne, Nemo, Snickers Production Latvia, Spectre Latvia. Students choose their practical placement's places according to their specialisation. The coordinator of the practical placement and the director of the study programme assess the student's choice and approve it or recommend another practical placement venue. A single cooperation agreement is signed with a company regarding provision of practical placement for a particular student.

Irrespective of the variety of the selected places during the practical placement students perform

uniform tasks which are related to the specifics of the study programme “Clothing and Textile Technology” and solve the tasks defined in the practical placement programme. Students mainly choose their practical placement venues by themselves, in compliance with their own interests, however, in case of necessity, the practice coordinator of the IDT and relevant professors, as well as the RTU Career Centre help to find an practical placement venue. There are cases when companies and organisations approach RTU and offer places for practical placement.

2.5. 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 evaluations of the final theses.

The process of developing and defending a student's Bachelor's thesis allows to assess whether the goal of the study programme and learning outcomes have been achieved. At this stage of the study, students need to apply the complete set of knowledge, skills and competences they have acquired while studying. By developing the study graduation papers, students demonstrate the research skills acquired during studies, as well as the ability to work with international data bases accessible at the RTU library by using the electronic access from the uniform ORTUS study environment. Students select a topic of their graduation paper from the list of topics proposed by the academic staff of the study programme or propose a topic by themselves. Choice of topics is coordinated by the director of the study programme. The theme should be topical and correspond to the specifics of the study programme. The supervisor of the Bachelor’s thesis is recommended by the director of the study programme based on the scientific research interests and competences of professors in the relevant field. The themes of the Bachelor’s thesis are discussed at a meeting of the department. The theme of a graduation paper and the scientific advisor is attested by the Director of the study programme and approved by the Dean.

The themes of the developed Bachelor’s thesis are closely linked with the outcomes to be achieved within the study programme because, after completing their studies, students should be able to assess the processes and issues in the national economy, as well as to know the core directions of development of the industry. Upon graduation from the study programme, students should understand the principles of operation and the indices of the economic performance of a manufacturing company. Moreover, by performing a research project, they should demonstrate the ability to obtain, process, analyse and use information; to perform research on the matters of development of the industry products; to interpret and analyse their results; to use information for resolving particular issues of the manufacturing technology; to prepare and present the performed research at a high quality level.

The graduation papers of the professional Bachelor’s study programme “Clothing and Textile Technology” are very varied as regards the themes. The general themes, like modernisation and development of a sewing or textile production plant or process are investigated within the projects of study courses, i.e. prior to development of the Bachelor’s thesis. Themes of graduation papers are related to the topical needs of the industry - utilisation of clothing and textiles, design and production of smart clothing and smart textile or a specific order from a manufacturing undertaking which provided practical placement. By performing analysis of the themes chosen in graduation papers, the themes conforming to the directions of the research activity of IDT and the ones where there are developments for support and improvement the study work, as well as the ones related to searching for solutions of the topical issues in the manufacturing companies of the industry should be distinguished.

- A large part of the graduation papers are focused on *design of smart textile products and smart clothing* in compliance with the scientific direction of IDT “Research of smart textiles, clothing, sewn products and relevant electronic systems and development of innovative solutions”, for example, “Energy Generating Outwear”, “Light Emitting Diodes for Accessories”, “Integration of Electroluminescent Wire into Gown”, “Integration of Electronical Devices in Sportswear”, “Woven Three-Dimensional Pressure Sensors”, “Embedment of body posture monitoring tensile sensors in underwear”, “Biathlon smart gloves”, “High Visibility Embroidery with Retro Reflective Thread”, etc.
- Bachelor thesis within the direction of *functional clothing and textiles, research and improvement of design of protective clothing, comfort in clothing and fit,* for example: “Train Track Fitter's Workwear”, “Reequipment of the LR SRS Uniforms”, “Reequipment of the LR State Border Guard's Uniforms”, “Protective Clothing Underwear Designing”, “Life Expectancy of Field Uniforms Trousers”, “Seams of the Latvian Army Field Uniform`s Trousers”, “Clothing Pattern Grading”, “Systematization of pattern grading methods”, “Development of constructively complicated clothing models ”, “Posture Correctors”.
- During recent years the issues related to *utilisation of clothing and textiles by production of renewable resources and use of domestic raw materials in textiles*, are being actively solved in the Bachelor’s thesis, for example: “Textile Waste Disposing and Recycling”, “Zero Waste Clothing”, “Textiles of recycled polyester”, “Sustainability development in the clothing manufacturing companies”, “Cotton textile waste recycling”, “Non-traditional sustainable raw materials”, “Production of Sheep Wool Produced in Latvia”, etc.
- The *design of industrial collections of clothing for the needs of particular undertakings or customers*, is topical, for example: “Basketball Team Clothing”, “Development of constructively complicated clothing models”, “Knitted fabric upper body clothes for nursing mothers”, “Women's Clothes Designing in CAD System Comtense”, “Warm Underwear for Children” etc.
- *Themes proposed by manufacturing undertakings*, for example: “Collection "Capsule" pattern making for 66° North Baltic LTD”, “Clean Room Sewing Line in “Fristads Kansas Production””, “Knitted Shirts Production in “Fristads Kansas Production””, “Improvement of Garment Model Patterns in Company NYBO Dobele”, “Product Lifecycle Management “Snickers Production Latvia””, “Improvement of Quality System in Company Artex Latvia”, “Order`s Execution Process Improvement in "Yellow Cat" Ltd.” etc.

The complete information on the themes of the Bachelor’s thesis of the study programme “Clothing and Textile Technologies” is included in Annex 2.5.

In compliance with the “Regulations of Final Study Examinations” of RTU, the graduation papers of the professional Bachelor’s study programme are evaluated by the State Examination Commission of the study direction “Manufacture and Processing” consisting of minimum four commission members. Minimum a half of the Commission members, including the Chairperson of the Commission, are representatives of professional organisations or employers of the textile and clothing manufacturing industry. The other part of the Commission members are lecturers of IDT DCTT, of whom minimum two hold the PhD degree in the sub-branch of textile and clothing technology of the materials sciences. The composition of the Commission is proposed by the Director of IDT and approved by the RTU Rector latest one month prior to the final examination.

Not only the representatives of the companies assigned to the State Examination Commission, but also manufacturers who are interested to attract young professionals to their companies, are invited to the defence procedure of graduation papers. For the industry representatives this is a great opportunity to learn about the solutions proposed in the students’ papers. During discussion of the results of defence, manufacturers are particularly asked to assess the topicality of the

themes of the students' projects, to point out deficiencies and to propose perspective directions of research or practical elaborations for next graduation papers or further research within the Master's programme.

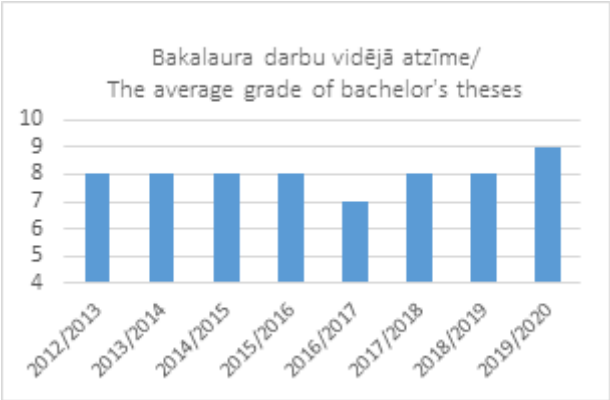


Fig. 2.1. Mean assessment of graduation papers

The mean assessment of graduation papers was 8.07 during the report period. The Bachelor's thesis of 12 students received the highest possible grade during the report period.

2.6. Analysis and assessment of the outcomes of the surveys conducted among the students, graduates, and employers, and the use of these outcomes for the improvement of the content and quality of studies by providing the respective examples.

The students' survey is organised at the end of every semester (also in the interim stage starting from the spring semester 2021) at the RTU portal ORTUS. Surveys include questions regarding accessibility of study materials of each particular study course, the professor's assessment criteria, work culture and quality, compliance with the students' rights during the classes, the time devoted to the student's independent work and studying discipline. The concluding part of the questionnaire is intended for students' suggestions and recommendations for improvement of the quality of the study course and the professor's work.

Questionnaires are anonymous to ensure that provided answers cannot affect the professors' attitude towards a particular student or a group of students and the goal of receiving the objective assessment by students is attained. Thus, students can provide the feedback regarding the quality of study courses and the professional activity of the academic staff. At the conclusion of the studies, the graduates' survey on the study programme as a whole is carried out. Each lecturer can see students' answers and to assess them to improve the study course. The directors of study programs have access to the assessments of all the study courses. The mean evaluation by students for the study courses implemented by IDT ranges from 4 to 5 points (on the scale of 5 points).

Students' survey results of the study programme in Latvian are attached in Annex 2.6. Out of the questionnaires of 18 questions sent to more than 100 students inviting them to participate in the survey, 44 answers were received. Answers were provided by 21% of the 2nd year students, 21% of the 3rd year students and 57% of the 4th year students.

More than 85% are either fully satisfied, satisfied or partially satisfied with the selected study

program. Almost 90% are either fully satisfied, satisfied or partially satisfied with the acquired theoretical knowledge. Almost 90% are either fully satisfied, satisfied or partially satisfied with the acquired practical skills. More than 88% consider that the ratio of practical and theoretical classes in the studies was optimum. Almost 75% are either fully satisfied, satisfied or partially satisfied with the schedule of classes, and approximately 23% presented objections in this regard. More than 88% are either fully satisfied or satisfied with the premises where classes take place. The biggest part, in particular, more than 90% are either fully satisfied, satisfied or partially satisfied (68% are fully satisfied) with the provision of auxiliary aids at classrooms. 84% consider that the study literature was available, and 16% experienced difficulties regarding their availability. More than 95% of the surveyed respondents answered that study materials are available in the e-study environment, approximately 75% admitted that they are either fully satisfied, satisfied or partially satisfied with the international cooperation of the higher education institution, and 25% see problems in this regard. More than 95% describe the time spend in studies at RTU as either fully satisfactory, satisfactory or partially satisfactory (45.5% of satisfied respondents, 20.5% fully satisfied and 29.5% partially satisfied). 25% answered that they participate actively or less actively in the improvement of the study process and more than 52% answered that they do not use this opportunity. Almost all the survey respondents expressed the opinion that they assess the RTU infrastructure as fully satisfactory, satisfactory or partially satisfactory (72.7% consider it fully satisfactory and satisfactory and 25% view it as partially satisfactory).

The summary of the *results of the students' survey*, leads to the conclusion that a majority of students are satisfied with the content of the study programme "Clothing and Textile Technology", the theoretical and practical skills acquired in the result of completing it, as well as the class rooms and technical equipment, the schedules of classes, availability of the study literature, the RTU infrastructure and international cooperation. Students refer to difficulties of completing the study courses, like mathematics and physics, as the main objections in surveys, however, inclusion of these study courses in the list of compulsory study courses is stipulated by the requirements for the profession and also the RTU strategy with the goal to provide comprehensive training of engineers for the national economy of Latvia. This issue was solved during the preceding years.

An opportunity to attend the classes of additional mathematics course. The plan of study courses per semesters was rearranged so that the mathematics course is completed first, followed by physics. The study program was supplemented by the courses topical for the industry "Clothing Material Development" and "Technical textiles".

Students expressed a wish to learn more about the specialisations of the profession of the clothing and textile manufacturing engineer in the first year. Therefore, the study courses "Fundamentals of Garment Patternmaking and Technology" and "Basic Principles of Textile Technologies" were incorporated in the study programme. There were comments regarding overlapping of topics among study courses. This matter is revised on regular basis by updating the content of the study courses. Students expressed objections regarding the timing of the study course "Practical Placement" (at a manufacturing company) of the last study year providing for 2 full days a week. Students suggest to schedule it in a single unit, for example, during 2 months. An important argument in favour of the current planning of the practical placement is based on the previous experience of IDT when students start full time employment at an company when they go there for an extended practical placement period, discontinue balanced development of the Bachelor's thesis and decide to terminate their studies.

The students' opinion regarding the necessity to upgrade the laboratory equipment at the IDT study laboratories should be fully agreed with, for example, this refers to the equipment of the layout and cutting laboratory, the equipment of the weaving and knitting laboratory and others for which there is not available funding.

The results of the survey of students of the study programme “Clothing and textile technology” in English are attached in Annex 2.6. The survey questionnaire was sent to the 3 current students and 3 answers were received. As 2 of the students were in the 2nd year and one was in the 1st year, it is difficult to receive objective assessment from them. Students’ satisfaction with the study programme, the theoretical and practical knowledge provided, the available literature and the schedule of classes is average. Students are satisfied with the study premises, equipment and auxiliary aids there. As regards recommendations for the content of the study programme, students suggest teaching of the history of the Latvian textile industry to them instead of the history of the Latvian culture (the course is withdrawn from the study programme), they also suggest to replace examinations as the form of tests with study papers and presentations; they also wish to visit as many as possible Latvian textile industry undertakings every semester. As regards identified deficiencies and problems in the study process, students refer to unconvincing use of English by professors, which can be explained by the fact that these are the first years of implementing the study programme in English. Some students are not satisfied that practical assignments are delivered by young academic staff who are PhD students at IDT.

The results of the graduates' survey are attached in Annex 2.7. The results refer to the surveys of the graduates of the study programme “Clothing and Textile Technology” if the last 8 years, starting from academic year 2012/2013 up to academic year 2019/2020. The total number of respondents is 82. The response rate to the survey by graduates has been from 62% up to even 100%. The summary of the graduates’ answers leads to the conclusion that a majority of graduates (68-78%) are satisfied with studies at RTU, they are satisfied with the selected study programme, the theoretical and practical knowledge provided therein. Satisfaction is lower (56%) as regards the scheduling of classes, where main objections are related to problems of combining studies and employment, as 47% of the graduates answered that they worked during the study period. The mean load of employment of graduates is 0.65 and for two thirds of employed students the work is related to the field of studies. Satisfaction with the study premises and materials is high, above 80%. According to the students’ assessment, the availability of literature of study courses and other information is above 70%. More than two thirds of the graduates (73%) would recommend this study programme to others. Graduates, like students, also recommend to consider upgrading of the workshop equipment and supplementing of IT software range, in particular, in the direction of the textile technology.

The results of the employers' surveys are included in Annex 2.8. Out of the questionnaires sent to 21 employers inviting them to participate in the survey, 5 answers were received. Employers describe the graduates of the study programme as employees with a high level of theoretical and practical training background and ability to work in a team. The majority of representatives of companies were not involved in the development of the study programme due to being busy at the work. Representatives of companies admit that study excoursion to companies of all specialisations should be provided to students to create a more comprehensive overview of the industry. The survey respondents think that the graduates of the study programme and the students coming for practical placement have acquired the profession competences, are able to use the acquired theory basis and skills in practice, can direct their professional improvement, assume responsibility and initiative and to take decisions in most cases. In their recommendations the respondents encourage the lecturers of IDT to continue cooperating with the industry professionals for improvement of the quality of studies.

There is demand for our graduates and this is confirmed by their employment at these manufacturing companies. Following the practical placement period of the 4th study year, employment contracts were signed by a substantial number of Bachelor graduates who work now in the clothing manufacturing undertakings, like Snickers Latvia, Spectre Latvia, Printfull, Fristads

Kansas Production, 66° North Baltic etc. Employers express mainly positive evaluation of the graduates' knowledge and ability to work following their studies.

2.7. Provide the assessment of the options of the incoming and outgoing mobility of the students, the dynamics of the number of the used opportunities, and the recognition of the study courses acquired during the mobility.

Students of the professional Bachelor's programme "Clothing and Textile Technology" use the mobility support possibilities provided by ERASMUS programme. During the period from academic year 2013/2014, 7 students have studied one Erasmus semester at foreign higher education institutions. Students choose higher education institutions of Germany, Greece, Turkey and Sweden (see Table 2.2).

Table 2.2

Erasmus studies

Study year	Country	Higher education institution	Duration	Number of students
2013/2014	Germany	University of Applied Sciences, Hochschule Niederrhein	1 semester	1
2015/2016	Sweden	University of Boras	1 semester	1
	Turkey	Ege University	1 semester	1
2016/2017	Germany	University of Applied Sciences, Hochschule Niederrhein	1 semester	1
2018/2019	Greece	University of West Attica	1 semester	2
2020/2021	Germany	University of Applied Sciences, Hochschule Niederrhein	1 semester	1

The analysis of the number of students in the outgoing mobility indicate that this could have been higher. Students are well aware of this opportunity, and in discussions with them the main reason why many don't use it are revealed. Usually students of the 2nd and 3rd study year participate in the mobility program because the practical placement in a manufacturing company and development of the Bachelor's thesis is started in the 4th year. At this time many students have found permanent employment and do not want to leave their jobs. The unwillingness to cut relations with the family is among important reasons among young girls.

Positive references regarding the level of the students' theoretical and practical knowledge have been received from partner higher education institutions who hosted students of the study programme "Clothing and Textile Technology". The offered study courses in partner higher

education institutions are similar and students do not experience problems as regards recognition of study courses completed abroad at RTU.

Recognition of study courses completed during the mobility is done based on the order of the RTU Study Vice-Rector of 29 October 2014 No. 01000-1.1/240 “On amendments in the procedure of organisation of Erasmus+ student mobility” and order of 4 April 2016 No. 02000-1.1/29 “On the procedure of recognition of study courses completed at other higher education institutions and study programs”. The recognition of Erasmus period is done by the director of the study programme following the student’s return from Erasmus studies, based on the transcript of records and the application on recognition of study courses signed in advance.

Prior to leaving, the student individually agrees on the list of the study courses to be completed at the foreign higher education institution which will be considered equal to the study courses to be completed in the relevant semester of the RTU study programme with the director of the study programme. If there are any changes during the mobility programme, they are agreed on electronically. After returning from the exchange programme, the study courses completed by the student at the foreign education institution are recognised if a positive grade was received. This is confirmed by the documents issued by the partner higher education institution, in particular, the Transcript of records. All the process of documents related to Erasmus studies and mobility is provided by the RTU Department of International Cooperation and Foreign Students. The search tool for Erasmus partner higher education institutions is available on RTU Erasmus+ site:

https://www.rtu.lv/en/internationalization/mobility/erasmus-plus/erasmus-outgoing-mobility/partners

On the site there is a list of foreign higher education institutions who offer study programmes in the thematic fields: textiles, clothing, footwear and leather.

It should be admitted that the mobility of the students of the study programme should be encouraged. It should also be concluded that the level of knowledge of the students of the study programme is appropriate to enable them to acquire knowledge, skills and competences provided by study courses implemented by other internationally recognised higher education institutions, which fact is attested by the success of the students who have used Erasmus studies.

III - DESCRIPTION OF THE STUDY PROGRAMME (3. Resources and Provision of the Study Programme)

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. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

As from December 2013, the professional Bachelor’s study programme “Clothing and Textile Technology” is implemented in the new building of DTI at Ķīpsalas Street 6 in Riga, where there are premises for IDT, the Faculty of Architecture and RTU Design Factory. Environment compliant with

modern requirements is provided there. All the rooms intended for the study process are equipped with multimedia hardware, i.e. a computer with the Internet connection, a system of speakers and an overhead projector. Thus, it is possible to provide a modern study process. The below listed laboratories and workshops are used for the needs of the study programme “Clothing and Textile Technology” in the building of IDT at Ķīpsalas Street 6.

Table 3.1

The laboratories, work spaces (workshops) and their equipment used for the needs of the study programme "Clothing and Textile Technology" at the building of the IDT at Ķīpsalas Street 6

Room No.	Name, area (m^2)	Description
IT laboratories		
224	Clothing and textile products design CAD/CAM laboratory (53.5 m^2)	Specialised computer controlled design and simulation systems are available for textile design and technical calculations, preparation of clothing details, design, template production, fabric layout calculations, production of the cut-out assignment and placement of templates: Grafis CAD Software, Lectra, Assyst, Comtense, Pe-design, Koppermann, Tex-Design. Equipment: 16 computer desks, the plotter Canon iP770 for printing out drawings and details.
225	Simulation and design laboratory (79.7 m^2)	Various computer controlled design and simulation systems are available, providing high quality and modern study process- the general application 2D and 3D design, calculation and image processing systems and application software: SketchUp, ArchiCad, SolidWork, Autodesk 3DS Max, AutoCad, Adobe Photoshop, Adobe Illustrator, Adobe Indesign, Adobe Dreamweaver, Comsol Multiphysics, Revit, MatLab, MS Office + MS Visio. Equipment: 21 computer desks.
Laboratory premises		

212, 213	Materials sciences laboratories (59.1 m^2; 77.1 m^2)	The laboratory equipment provides testing and research of the most common physical properties of textile. The equipment is used both in the study process and scientific research. Students are first introduced to the testing of core properties of fibre, yarns and fabrics and evaluation of obtained results in the laboratory in the study course “Basics of Textile and Leather Materials Science”. The acquired basic knowledge is supplemented within the project of the study course “Clothing Materials Science” by assessing suitability of selected materials for production of a particular product. The students of the textile technology specialisation learn testing of fibre and yarns more extensively to assess their conformity to technological requirements and perform more comprehensive analysis of properties of fabrics and perform their more extensive testing. The laboratory equipment is used during development of the Bachelor’s thesis for the purpose of investigation of materials and assessment of compatibility. Equipment: sweating guarded hotplate, Martindale abrasion and pilling resistance tester, air permeability tester, wrinkle recovery tester, crease recovery tester, shirley stiffness tester, crockmeter/rubbing fastness tester, fabric drape tester, spray rating tester, universal testing machine, Q-Sun Xe-2 Xenon test chamber, BINDER constant climate chamber, tumble dryer, washing machine, water resistance testing machine, electronic balances, yarn twist testers, yarn unbalance tester, yarn strength evaluation tester under multiple tension, microscopes, yarn examining machine, wrap reel.
211	Sewing machines mechanics and embroidery laboratory (46.8 m^2)	Provision of completion of laboratory assignments within the following study courses: “Sectoral Engineering”, “Technological Equipment of Sewing Factories”, “Basics of Machine Embroidering”, “Machine Embroidering”. Research in the science direction "Integration of electronic elements in textile by embroidery" can be performed in the laboratory. Equipment: laboratory models of sewing machines for studies - a single needle lockstich, two needle lockstich, single needle hidden stich, two needle flat stich, single needle edge chainstich, two needle chainstich, figural button hole equipment. Embroidery machines - Brother PR600II and Innovis 750E and embroidery computer software Wilcom embroidery studio e4. Straight knife cutting equipment EASTMAN class 621.

214	Anthropometric laboratory (51.8 m^2)	The work of the laboratory is based on studying measurements and build specifics of a human body for use in the improvement of clothing and other products and the analysis of their interaction with the human body - fit and ergonomics. Bachelor's level students are introduced to the principles of operation of the equipment, as well as within the study course "Basics of Anthropology for Clothing Studies" they are 3D scanned and trained in the use of manual methods. The functions of the system AnthroScan in the processing of measurements and the use of additional tools in the investigation of specifics of the human body are presented to the Master's level students. A computer-aided design and 3D prototyping system is used for experimental designing and analysis of various assortment of clothing for implementation of various research processes and graduation projects. The laboratory performs scanning of individuals, groups of people and various items, data processing, preparation of images and files of various formats is performed in the laboratory. Equipment: The human body 3D scanning device Vitus Smart XXL® (Human Solutions Group GmbH) with the data processing system AnthroScan. Tools: anthropometers, measuring tapes, calipometers for obtaining the measurements of the human body by manual methods. Computer systems: CAD/CAM system Assyst with the virtual prototyping module Vidya.
424	Measurements laboratory (21.6 m^2)	The laboratory is suitable for performing various practical research of various materials (including textiles), testing of materials and identification of their properties. It is intended for implementation of the following study courses: "Basics of Textile and Leather Materials Science", "Technical Textiles", "Clothing Material Development". The laboratory equipment is also used for development of graduation papers. It is also used for performing research of the Master and Ph.D thesis. Bruker AFM atomic force microscope; Permatest SENSORA device for determining the heat resistance and vapour permeability of cloth; Fungilab viscosimeter (the possibility to determine the viscosity and electrical conductivity of liquids); Motic microscope with a camera and 100x possible magnification; magnetic and mechanical mixers; Rhopoint device for determining the surface gloss. Required climate conditions can be provided and adjusted in the laboratory. Preparatory works for performing experiments at ESM measurement, wood materials and textile materials research laboratory are performed in this laboratory.
425	Textile materials research laboratory (30.2 m^2)	The laboratory is used for research where thermal treatment is required, for example, research of new materials or their coatings. The theoretical knowledge acquired in the research laboratory are supplemented with practical laboratory assignments, students master basic skills for performing research, and also learn in-depth research and use of various equipment. The laboratory equipment is also used for performing research of the Master and Ph.D thesis. Equipment: autoclave (for sterilisation); thermal cabinet (thermal treatment of samples); autoclave (for sterilisation), thermal cabinet (thermal treatment of samples) and Permatest equipment for determining the heat resistance of fabric. It is equipped with an interactive board and a projector to provide environment for research work groups.

104 a	Textile laboratory (73.6 m^2)	Equipment can be used to prepare fibrous web for samples of nonwoven or composite materials; to prepare a warp beam for weaving, to weave traditional and smart fabrics. Samples for study and graduation projects and research can be produced in the laboratory. Equipment: automated projectile weaving loom, warping machine with creel , laboratory carding machine, yarn twisting machine.
Work spaces (workshops)		
201	Sewing workshop (88.9 m^2)	The workshop is suitable for sewing of garments and their collections, practical classes in the study courses of clothing technology and design, as well as for practical placement. Equipment: 9 lockstitch sewing machines; one 5 thread industrial overlock sewing machines, two 4 thread household overlock sewing machines, 5 thread (3 needle flat seam sewing machine; buttonhole machine; equipment for inserting press buttons and other metal elements, two ironing stations with a steam generator, fusing equipment (continuous operation press); 8 desks); 1 computer desk, a white board, a water treatment device.
202, 202a	Fashion design master workshop (156.8 m^2)	The workshop is suitable for development of garments starting from sketches to ready collections. Students acquire both theoretical knowledge and work in practice, master basic knowledge and specific skills for design of clothing - modelling, construction, cutting, sewing and fitting of clothing. The technical equipment of the laboratory conforms with the work environment of a production undertaking. For research purposes the laboratory prepares various samples for in-depth investigation by the Material sciences laboratory. The equipment is suitable for development of clothing: Tables for cutting; ironing equipment - Batistella 2 pcs.; a steam press; sewing machine Siruba L818D-H1; sewing machine Juki DU-1181N; sewing machine Juki DDL-8700B-7; sewing machine Brother Z-8550A-031; overlock sewing machine Juki MO-6714S, tailors mannequins, holders for placing products.
203	Tie-dyeing Workshop (11 m^2)	The workshop is suitable for tie-dyeing and artistic treatment of textiles. It is equipped with a bath, textile steaming equipment Uhlig Fixiergerät No.0043 and a microwave oven.
209	Weaving Workshop (54.4 m^2)	In the workshop it is possible to weave traditional, smart and functional fabrics. Students learn weaving basics, production of fabric of a varied level of complexity (including multi-layer fabric), and production of smart and functional textiles. Samples for study and graduation projects and also research can be produced in the laboratory. Equipment: weaving handlooms (width: 1 m; 1,5 m; 2 m), including that one of the looms is equipped with a second warp beam - it is possible to weave multi-layer fabric; programmable 24 shaft weaving loom (width 40 cm) - for production of complicated woven fabrics.

210	Knitting Workshop (59.4 m^2)	In the workshop it is possible to produce both traditional and smart knitwear products. Students have an opportunity to learn basics of knitting, production of complicated knitted patterns and development of smart textiles. Samples for study and graduation projects and research can be produced. Equipment: double bed 5th category knitting machines (8 pcs.), a stitch-bonding machine (for joining knitted parts), sewing machines for knitted fabrics.

Lectures for students are held in the classrooms shared by IDT and RTU at Ķīpsalas Street 6; IDT classrooms - 205, 206, 207, 208, the shared IT laboratory 228, and the shared classroom 117.

The equipment of the Fashion Design Master Workshop and the Sewing Workshop was considerably supplemented upon starting the study process in the renovated building in 2013 by adding modern industrial sewing equipment: a computerised straight stitch sewing machine Juki DDL-8700B-7; a computerised zig-zag stitch sewing machine Brother Z-8550A-031 and the new model of the stitching and overhand stitching sewing machine Juki MO-6714S. During this period regular service and maintenance of the equipment is performed. The computer hardware was updated in the clothing CAD/CAM laboratory, 16 computers were replaced. 10 tailors mannequins and six portable stands for storing produced garments were purchased for the needs of the workshops in 2020. Regular updating and maintenance of specialised IT software is performed. Automated window blinds are installed in the windows of several workshops and laboratories (201, 202, 202a, 205, 429).

Students have MS Office and specialised computer software necessary for acquiring the study programme. In all the RTU premises students and the academic staff can use free of charge Wi-Fi connection. For the academic staff a computer and a well equipped work desk is provided at Ķīpsalas Street 6, in the rooms intended for the academic staff.

The methodological materials are regularly updated for all the study courses and the academic staff uploads them to RTU ORTUS environment. The methodological provision is supplemented also by the methodological materials and monographs prepared and published by the academic staff, for example, the brochure by the Professor Skaidrīte Reihmane “Theory and technology of textile printing” for learning textile chemistry, which was reviewed by the Professor of IDT Ilze Baltiņa,

Six other faculties of RTU, their institutes and departments are also involved in implementation of the study programme: IDT DCTT; FMSAC Department of Optics and the Department of Polymer Materials Technology, the Faculty of Labour Protection and Civil Defence and the Department of Innovations and Business Management of the Faculty of Engineering Economics and Management; the Department of the Probability Theory and Mathematics Statistics of the Faculty of Computer Sciences and Information Technology; the Department of Fine Arts of the Faculty of Architecture; the Department of Special Use Languages of the Faculty of E-studies and Humanities Sciences; the Department of Environment Protection and Heat Systems of the Faculty of Electrical Engineering and Environment Engineering Sciences.

In order to improve the study environment of RTU, a large scale project “RTU – a City in the City” is being implemented, and its implementation will result in creating the most modern study centre of engineering sciences in the Baltic region - a student campus which will consist of RTU faculties, administrative buildings and the Scientific Library in future, providing more convenient access to services.

The RTU Scientific Library maintains subscription for more than 20 data bases (the full list of data bases is available at:

https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/abonetas-datubazes.

The data bases of books most appropriate for the study program EBSCOhost Ebook Academic Collection, Proquest Ebook Central (Collections: Science&Technology; Business); SpringerLink (Collections: Engineering; Chemistry; Materials Science). *Most appropriate data bases of scientific articles* ScienceDirect; EBSCO Academic Search Complete; EBSCO Applied Science & Technology Source; Wiley Online Library; IEEE Xplore Digital Library. In the Scientific Library there are the latest periodicals, statistics materials, books, conference materials on the matters of economics and business. Every year the library funds are supplemented with both teaching and scientific literature, as well as periodicals usable for the study work. Financing is allocated every year for purchasing literature for the needs of the study program, and the academic staff orders necessary issues.

The study programme “Clothing and Textile Technology” is implemented in the study direction “Production and Processing”, where in the reporting period a total of 91 special book units were purchased. 42 of them belong to the specialization direction “Clothing and Textile Technology”. Some of the purchased book units correspond to both specializations and are not strictly related to only one field or one study programme. More extensive information about the Scientific Library and its resources is available in Chapter 3 of Section II.

Also other RTU infrastructure elements are available for the needs of students and the academic staff, like canteens and cafes, the copy rooms, students' hostels, RTU sports and recreation centres, a swimming pool, etc. In the premises of RTU there are vending machines for buying drinks and snacks, potable water is available.

The state budget grants and students' tuition fees are utilised for implementation of the study program. Information regarding the financial resources of the professional Bachelor study program "Clothing and Textile Technology" is presented in Table 3.2.

Table 3.2

Funding of the study programme

Study year	State budget funding, EUR	Tuition fees of domestic students, EUR	Tuition fees of foreign students, EUR	Total funding for the program, EUR	Costs per student, EUR
2013/2014	139,709.00	19,575.00	-	159,284.00	3,866.00
2014/2015	164,881.04	13,662.00	-	178,543.04	3,866.02
2015/2016	159,766.23	5,886.91	-	165,653.14	3,866.02
2016/2017	178,007.56	3,536.84	-	181,544.40	3,866.02
2017/2018	177,523.28	3,479.88	-	181,003.16	4,040.66
2018/2019	184,962.51	-	9,711.85	194,674.36	4,229.68
2019/2020	224,631.73	-	13,842.96	238,474.69	4,405.04

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

III - DESCRIPTION OF THE STUDY PROGRAMME (4. Teaching Staff)

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

30 to 32 members of the academic staff are involved in implementation of the study programme “Clothing and Textile Technology”, in particular, 13 to 14 from IDT DCTT and 17 to 18 from other RTU units. Among them there are 7-8 professors, 8 associated professors, 8 assistant professors, 1-2 practical assistant professors, 1-2 lecturers, 1 assistant, 1 leading researcher, 1 researcher and 1 research assistant. In comparison to academic year 2013/2014, the number of the academic staff of the study programme has decreased. 45 members of the academic staff were involved in implementation of the study programme in academic year 2013/2014. This is related to a large extent to the fact that in academic year 2013/2014 the theoretical and the practical part of a single study course was delivered by different academic staff, who often had the same qualification. At present the same professor delivers and is in charge of both lectures and practical and laboratory assignments, by involving Ph.D students as assistants for performing certain practical assignments. In this way the teaching skills of new colleagues are developed.

In comparison to academic year 2013/2014, now the study programme is implemented by more members of the academic staff possessing the Ph.D degree (see Figure 4.1). Their percentage share has increased from 62 % to 80 %.

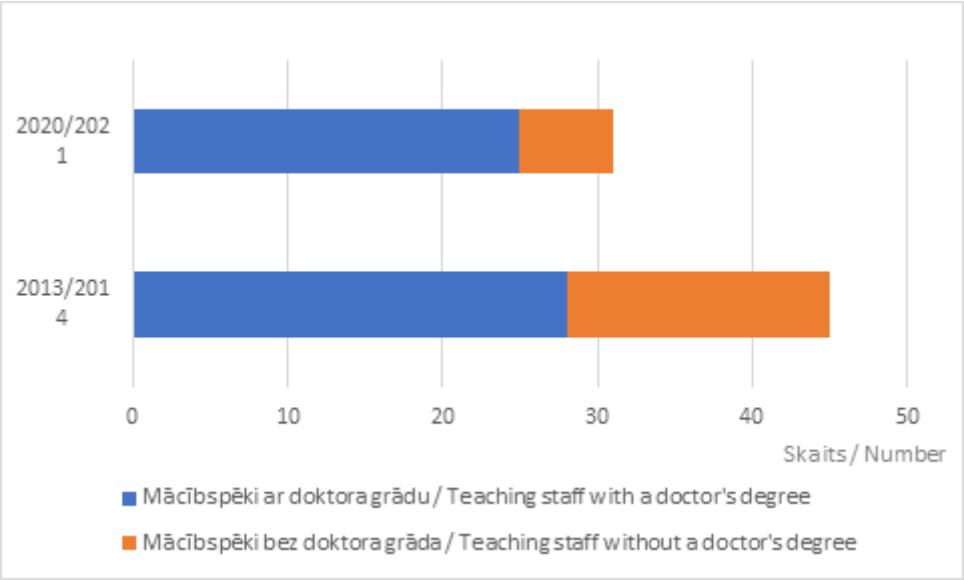


Fig. 4.1 The number of the academic staff of the professional Bachelor’s study programme “Clothing and Textile Technology” possessing the PhD degree

There is the highest percentage share of professors, associated professors and assistant professors among the academic staff of the study programme in academic year 2020/2021 (see Table 4.1).

Table 4.1

Professors in the professional Bachelor's study programme

Academic year 2020/2021	Program in Latvian, number	Program in English, number
Professors	8	8
Associate professors	8	7
Assistant professors	8	6
Practical assistant professors	2	1
Lecturers	1	1
Assistants	1	1
Researchers	1	1
Leading researchers	1	1
Research assistants	1	1
Guest academic staff	1	-
	32	**27**

The changes in the academic staff in the profiling Department of Clothing and Textile Technology implementing the study programme during the report period are summarised in Table 4.2.

Table 4.2

Changes in the academic staff of IDT DCTT

Academic year 2013/2014	Number	Mean age	Academic year 2020/ 2021	Number	Mean age
Professors	1	59	Professors	1	61
Associate professors	3	53	Associate professors	4	54
Assistant professors	4	46	Assistant professors	2	50
Practical assistant professors	1	56	Practical assistant professors	1	55

Lecturers	2	44	Lecturers	1	39
Assistants	1	40	Assistants	1	50
Leading researchers	2	72	Leading researchers	1	55
Researchers	1	55	Researchers	1	37
			Research assistants	1	34
``			Guest academic staff	1	52
Total number/ mean age	15	53		14	49.5

The professor Ausma Viļumsone, who had been the head of DCTT for a long time, terminated her work at DCTT and retired in 2017. The long-term professor of the Institute, associate professor Ivars Krieviņš passed away in 2016, the long-term professor of DTI Nadežda Ozoliņa is not working in the Institute as from academic year 2014/2015. Most of the professors of the Institute have improved their qualification during the report period: Ilze Baltiņa was elected to the position of the professor in 2015, Dana Beļakova, Inga Dāboliņa, Uģis Briedis and Aleksandrs Okss were elected to the positions of associate professors in 2017 and 2019. Ph.D degrees were awarded to Jānis Dāboliņš and Gaļina Terļecka and they were elected to the positions of assistant professors. Anna Kalnāja was elected to the position of the practical assistant professor, Elīna Rožkalne possessing the Mg. art. Degree was elected to the position of the lecturer in 2015. Three Ph.D students have joined the academic staff of IDT, a researcher, a research assistant and an assistant. In comparison to academic year 2013/2014, the above changes have not caused substantial change in the composition of professors (see Table 4.2).

Within the SAM project "Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas" supported by the European Social Fund, an associated professor from Minho University (Portugal) worked in the Department as the guest professor in the study programme in 2019. Within this project the professor Eugenija Stazdiene from Vilnius University of Applied Sciences participated in implementation of the study programme in year 2019/2020 and has joined the IDT team of the academic staff.

As a result of changes in the teaching staff, highly qualified teachers and researchers in the field of clothing and textile technology have been attracted to the implementation of the bachelor's study programme “Clothing and Textile Technology”, as well as two young scientists and associate professors have grown up on the site of IDT. One of them has established and manages a scientific research laboratory, as well as doctoral, master's and bachelor's theses and study courses. The second new IDT associate professor manages the entire IDT as a director, as well as regularly attracts and manages Erasmus + and research projects of various levels, manages the new master's study programme, doctoral, master's and bachelor's theses and study courses. Changes in the teaching staff have a positive effect on the quality of the study process. Students have the opportunity to get acquainted with a wider range of research equipment, use them in the study process and in their research in the final theses. Students are regularly involved in various levels of scientific and practical projects implemented by IDT - this attracts young people to the university.

4.2. 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.

Highly qualified academic staff is involved in implementation of the study programme "Clothing and Textile Technology", 80% of the academic staff implementing the study programme possess the Ph.D degree. Also colleagues from the Faculty of Engineering Economics and Management, the Faculty of Computer Sciences and Information Technology, the Faculty of Architecture, the Faculty of E-studies and Humanities Sciences, the Faculty of Electrical Engineering and Environment Engineering participate in implementation of the study programme besides the academic staff of FMSAC. This approach provides the inter-disciplinary nature of the study programme. In selecting and involving the academic staff, the study programme management aims to achieve the highest possible efficiency of the study programme and to provide an opportunity for students to achieved the envisaged learning outcomes.

Academic staff of the profiling department of the professional bachelor study programme "Clothing and Textile Technology":

Dana Beļakova, Dr. sc. ing., associate professor, leading researcher, RTU, the Faculty of Materials Science and Applied Chemistry (FMSAC), Institute of Design Technologies (IDT). Professional work experience since 1992. Her work at the university began more than 18 years ago, performing pedagogical, scientific and administrative work in 2003. The conducted courses can be divided into three areas of professional competence and are related to clothing design and production (including clothing design and technology, work performance rating in clothing production companies), design and technology project management and solving sustainability issues. Competence in design and technology project management and sustainability issues is based on work in several international (ERASMUS+, INTERREG) and national (ERDF, FLPP) research and education projects as a project manager, coordinator and researcher. The research component in working with students is provided by participation in scientific conferences and more than 50 publications in areas of competence. RTU pedagogical qualification upgrading courses and various seminars have been regularly attended, ensuring the knowledge of the latest trends in the field, promoting acquisition of new pedagogical and professional methods, which allow students to acquire latest developments related to the industry. The opportunities of the Erasmus + academic staff exchange programme have been used by periodically visiting foreign universities for experience exchange. Participation in the development of modular vocational education programmes and in the development of the digital teaching tool "Manufacture of sewn products". Participation in the work group in the development of the professional standard "Clothing and textile technologist". Director of IDT since 2017 and Head of the Department of Clothing and Textile Technology since 2016. Expert of the Latvian Council of Science since 2010 in the Materials Science sub-branch – Textile and Clothing Technology. Several awards granted by the Prime Minister of the Republic of Latvia have been received for preparing excellent contestants for participation in the European Young Professionals Skills Competition "EuroSkills" in the field of fashion technologies.

Ilze Baltiņa, Dr. sc. ing., leading researcher, RTU, FMSAC, IDT, the Department of Clothing and Textile Technologies. Academic and scientific work in the higher education institution has been

performed since 1989, specialising in clothing and textile technology. Work experience is based on more than 70 scientific publications. The rights of an expert of the Latvian Science Council in the sub-branch of textile and clothing technologies in the field of material science. The conducted courses are related to three areas of specialisation, such as textile production technologies and new product development (Basic Principles of Textile Technologies, Analysis of Woven Fabric Structures, Weaving Technology, Technology and Bases of a Yarn Design, Textiles Development, Production of Nonwovens, Industrial Equipment of the Branch Enterprises, Technical Textiles, Production of Technical Textiles, Development and Production of Technical Textiles, Jacquard Weaving Technology, Advanced Textile Technologies, Theories of Textile Technology), textile research, quality properties evaluation (Basics Of Textile And Leather Materials Science, Textile Materials Science, Textile Physics, Quality Assurance, Clothing Material Development, Product Life Cycle and Quality System, Textile material Research) and Smart Textiles (Development and Research of Smart Textiles, Innovations in Textile Materials). Regular supervision of elaboration of graduation papers in Master's and Bachelor's professional studies. Under the supervision of I. Baltiņa, a Ph.D thesis in materials science has been developed and defended. The knowledge and experience gained in projects and scientific work are integrated in the teaching process. As a leading researcher, she participates in both international (Erasmus +, INTERREG EUROPE) and national research and education projects. She is the Deputy Chairwoman of the RTU Trade Union and the Chairwoman of the IDT Trade union office. Member of the Latvian Council of Experts in the Textile, Clothing, Leather and Leather Products Industries. Member of the scientific editorial board of the 19th International World Scientific Textile Conference Autex 2019, as well as a reviewer of several scientific journals and collections of articles (Cellulose, Journal of Industrial Textiles, Textiles un Light Industrial Science and Technology). Participated in the preparation of two RTU patents. Participated in the exchange of experience of Erasmus academic staff. Regularly participates in professional development and training seminars.

Eugenija Strazdiene, PhD, professor, Vilnius University of Applied Sciences, Faculty of Arts and Creative Technologies. Started her professional career in 1984 in Vilnius (Lithuania), in the clothing company "Lelija". In 1987, she started working as a junior researcher at Kaunas University of Technology (KTU), conducting research on computer-aided material laying and cutting systems of Lithuanian clothing companies. In 2000, she defended her PhD thesis "The Investigation and Evaluation of Textile Products Biaxial Deformation Processes" (08T), then started working as an associate professor at the Department of Clothing and Polymer Products Technology, Kaunas University of Technology. During this period she has developed and taught the modules of the Bachelor study courses Fashion Visualization and Modelling and Fashion Engineering, as well as the Master's study modules Intelligent Clothing Engineering and Digital Clothing Production Technologies. In-service training in France (Haute Alsace University) and Great Britain (University of De Monfort). Since 2008, she has obtained the position of professor, performing pedagogical, project management, expertise and research work. Research directions: mechanical properties of textile and polymer materials; computer aided design and modelling; 3D scanning and design; sensory evaluation of fibrous materials; smart clothing and textiles. She has supervised 6 PhD thesis and one (1) postdoctoral project, has participated in the PhD thesis defence committee 16 times, and has been an opponent 4 times. The results of the research have been published in 4 publications in Web of Science database journals without reference index, 79 articles in conference proceedings (Autex, Clotech, FTC, ITMC, the Fibre Society, etc.), 9 articles in periodicals; co-author of The Glossary of Explanatory Clothing Terms (6000 terms in five languages); co-author of 9 training consultations. As from 2013 she has been a professor at Vilnius University of Applied Sciences. As a guest lecturer in 2014 and 2015 she read at Tallinn Technical College and in 2019 at RTU. Using ERASMUS mobility opportunities, she has visited RTU, the University of Ljubljana, Helsinki Metropolitan College, Vitebsk University of Technology, Rezekne Academy of Technology,

Lodz Technical University. Has been the manager of international research and study projects. In RTU RWCH0 study programme conducts the study course "Garment CAD system LECTRA".

Inese Ziemele, Dr. sc. ing., associate professor, RTU, FMSAC, IDT, Department of Clothing and Textile Technologies. Director of the study programmes “Clothing and Textile Technology” and the study direction “Production and Processing”. Professional experience: more than 20 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, leading researcher and associate professor. Research areas: sewn products manufacturing technologies, their management and logistics of clothing factories; research on technological solutions, and smart and functional clothing comfort; clothing assortment and quality research. Practical work experience in the position of a company sewn products manufacturing technologist. Research components in work with students are provided by participation in scientific conferences and development of publications. Periodically attends Erasmus + mobility activities in foreign universities, giving lectures at foreign universities, as well as participating and reporting at scientific conferences. Regularly working as a supervisor of Bachelor and Master thesis. Attended RTU pedagogical qualification upgrading courses. Additional regular participation in various seminars and international exhibitions of the industry, ensuring knowledge of the latest trends in the clothing and textile industry; promotes the acquisition of new methods, which allows students to acquire current developments related to the industry. She is an external member of the Sectoral Expert Council (NEP) (Textiles, Clothing, Leather and Leather Products Industry). Participated in the development of modular educational programmes and examination tasks for professional qualifications (level 2., 3., 4). Has led a working group for the development of a digital teaching tool “Manufacture of sewn products” for students of vocational schools and technical colleges. Regularly participates in international research projects. She has been a member of the jury commission of the National competition for young professionals SkillsLatvia.

Uģis Briedis, Dr. sc. ing., associate professor, RTU, FMSAC, IDT, Department of Clothing and Textile Technologies. Professional experience: more than 15 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, leading researcher and associate professor. Mg. sc. ing. in Textile Machinery Mechanics. The conducted study courses can be divided into two areas of professional competence and they are related to clothing production technologies and production equipment (their mechanics and operating principles), and sewing factory design (sections, production flow design, production equipment selection and location). Fields of research: research of technological solutions for smart and functional clothing (sub-fields: use of alternative energy sources in smart textiles; use of embroidery technology in prototypes of technical textiles); the latest equipment and technologies for the production of sewn products. Practical work experience in the trade of sewing and embroidery equipment. Participation in scientific conferences and development of publications for industry journals ensures the acquisition of the latest technologies and equipment and the research components for academic work. Supervisor of Bachelor and Master thesis. Attended RTU pedagogical qualification improvement courses, seminars and international exhibitions of the field, which ensure knowledge of the latest trends in the clothing and textile industry, promote the acquisition of new methods that allow students to learn about the topicalities related to the field. Expert of the Latvian Council of Science in the field of science ”Engineering and Technologies – Materials Science”. Participation in the development of modular educational programmes for professional qualifications. One of the authors of the digital teaching tool “Manufacture of sewn products”. Regular participation in international research projects. Membership in industry associations.

Aleksandrs Okss, Dr. habil. sc. ing., associate professor, RTU, Faculty of Materials Science and Applied Chemistry, IDT. Academic and scientific work in the higher education institution has been performed since 1983 specialising in mechanics, and clothing and textile technology. Work

experience is based on more than 50 scientific publications. Expert of the Latvian Council of Science from 2016 in the field of science "Textile and Clothing Technologies - Material Science". The conducted courses are related to knitting technology, design and application of smart textile products. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process.

Jānis Dāboliņš, Dr. sc. ing. in computer science, assistant professor, RTU, the Faculty of Materials Science and Applied Chemistry, IDT, Department of Design and Materials; researcher at RTU, Faculty of Computer Science and Information Technology. Professional experience: academic work experience of 15 years in a higher education institution by specialising in assessment of training and use of applications of computer controlled design, production systems (CAD/CAM), which is attested by participation in scientific projects and research programmes, participation in international scientific conferences and publications (totally nine, five of them in Scopus database). Students acquire knowledge in automation of documents by using software engineering languages, reflection of production processes in graphs, data processing and data visualisation. The most recent and topical tools are integrated in the study process.

Gaļina Terļecka, Dr. sc. ing., assistant professor and researcher, RTU, FMSAC, IDT, Department of Design and Materials Technologies. Academic and scientific work in the higher education institution has been performed since 2007, specialising in clothing and textile technology. Work experience is based on 17 scientific publications. The conducted study courses are related to clothing design, technology, and sizing. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. As a researcher and expert, she has participated in several international and national research projects. Participated in professional development and training seminars. Participated in the development of modular professional education programmes “Professional Qualifications in the Textile, Clothing, Leather and Leather Products Industry” and in the development of the professional qualification exam programme of the module “Block Pattern Grading”.

Anna Kalnāja, Mg. sc. ing., assistant professor (practical), RTU, FMSAC, IDT. 37 years professional experience: 34 years in the field of education, incl. 21 years of academic work in a higher educational institution (mainly as a lecturer in the study courses related to the manufacture and production of clothing); in production – 16 years. Supervising and reviewing of Bachelor theses. One of the authors of the digital learning aid “Sewn Product Manufacturing”. Follows current developments in the fashion industry, changes and novelties in the clothing industry, assortment offered by manufacturers, regularly visits textile industry companies. Information on current clothing processing methods, techniques, equipment and manufacturing processes are integrated into methodological materials for studies in the form of images, cut-out lay-plans, diagrams, tables, tasks and practical exercises. Tasks, tests, exercises aimed at remembering, conclusion and interpreting information, solving problems, have been developed for strengthening and testing knowledge. Regularly participates in professional development and upskilling seminars.

Elīna Rožkalne, Mg. art., lecturer, RTU, FMSAC, IDT. 6 years’ experience in preparing and reading lectures at RTU in the Basics of Visual Arts for Clothing Studies (in representation of fashion figures and garments, visualization of costume collection using various materials, garment construction drawing, image development, the history of fashion). Experience in supervision of Bachelor Thesis and work with international students. Practical experience working with the development of clothing collections (idea, sketches, the choice of fabrics, patternmaking, styling, cutting, sewing technology) of clothing of different assortment, experience in a lingerie company as a designer and a constructor. An extensive experience in the field of visual arts, application of various artistic means. Organization of fashion exhibitions and participation in group exhibitions.

Ilze Balgale, Mg. sc. ing., Mg. sc. soc., assistant, research assistant, RTU, FMSAC, IDT. Academic and scientific work experience in a higher education institution since 2019 specialising in clothing and textile technology. PhD studies since 2020, research direction - textile sensors. Participation in international scientific conferences, scientific publications. Professional experience: preparation and presentation of lectures and managing of textile technology practical placement in the RTU workshops. The study courses are related to two areas of specialisation: textile production technologies (yarn production, weaving, knitting, non-woven technologies, technical and smart textile development, industrial equipment and development of textile company), as well as marketing and merchandising (commodity science), provided by a master's degree in communication science and professional work experience since 1999. The latest research is integrated in the acquisition of study courses.

Eva Lapkovska, Mg. sc. ing., researcher, RTU, FMSAC, IDT. Academic work experience in a higher education institution (RTU) since 2016, specialising in materials science, textile and clothing technology. Participation in conducting study courses – assisting the professor in lectures, supervising laboratory work and participation in improvement of lecture materials and laboratory work of the study courses on The Anthropology of Apparel Science and Computer-aided Clothing Design Methods. Research interests include research in anthropometry for use in apparel design processes and sizing analysis, garment construction methods, functional garment design, human body 3D scanning, application of computerized (2D and 3D) design systems in garment design and research. Development of publications within the research (more than 20) and participation in local and international conferences. Participation in national and international projects (INTERREG, ERASMUS +), cooperation with companies and state institutions.

Liene Siliņa, Mg. sc. ing., research assistant, RTU, FMSAC, IDT. Professional experience: more than 2 years of academic experience in a higher education institution. Scientific activity and research have been carried out for more than 4 years, specializing in automated clothing design, sizing of clothing and comfort research, smart textiles, clothing and textile sustainability issues proved by participation in scientific projects and research programmes, participation in international scientific conferences and publications. Students acquire automated clothing design systems and basic principles, develop and present practical tasks.

Academic staff of other RTU structural units involved in the implementation of the study programme.

Juris Blūms, Dr. phys., professor, leading researcher, RTU, FMSAC, Institute of Technical Physics, Department of Optics; director of the Institute of Technical Physics. Scientific work at the higher education institution has been carried out since 1990 (in the Semiconductor (Physics) Research Laboratory) and since 1993 – a lecturer at the Department of Physics. At the moment he is the author and co-author of more than 80 scientific and methodological works, co-author of several LV patents and patent applications. The rights of an expert of the Latvian Council of Science in the sub-branch of materials (solid-state) physics of the field of physics and astronomy and in the field of engineering science and technology, in the sub-branch of materials science. The courses taught include both general (Introduction to Physics, Physics, Physical Foundations of Modern Technologies, etc.) and specializations (Introduction to Solid State Physics, Solid State Physics, Smart Materials Physics and Electronics, etc.). Under the leadership of J. Blūms, 2 doctoral theses in materials science have been developed and defended at this moment. As a leading researcher, he participates in both international (ERASMUS +, ERDF) and national research (Latvian Science Council grants, state research programmes) and educational projects (ESF, MES projects), their implementation and management. He is the manager of several contract studies and projects. Member of the Promotion Councils of RTU and the University of Latvia. Member of RTU Senate and Faculty of Materials Science and Applied Chemistry Council. Participated in ERASMUS academic

staff knowledge sharing. Regularly participates in professional development and training seminars. (Physics)

Vladimirs Jemeļjanovs, Dr. sc. ing., professor, leading researcher, RTU, Faculty of Engineering Economics and Management, Department of Labour and Civil Protection. Elected positions at RTU: leading researcher in the field Environmental and Power Engineering; professor in the field: Environmental and Power Engineering (Environmental Engineering). Expert of the Latvian Council of Science in Social and Economic Geography. (Civil Defence)

Elīna Gaile-Sarkane, Dr. oec., Bc. sc. ing., professor, leading researcher, RTU, Faculty of Engineering Economics and Management (FEEM), Department of Innovations and Business Management, the Dean of FEEM. Professional experience: academic and scientific work experience of more than 20 years in a higher education institution. The additional Bachelor degree in chemistry industry provides excellent base for academic and research work in the fields of innovation, management and business, therefore, scientific research is targeted at inter-disciplinary fields by covering the management science, management of innovations, technology transfer and various aspects of business. More than 150 scientific publications in the fields of management, economics and other related fields. More than 35 of them are published in internationally recognised issues or conferences indexed in international data bases (for example, Thomson & Reuter, Scopus, EBSCO, etc.). She is the author or co-author of four textbooks, three monographs and one patent. The expert of the Council of Science of Latvia. Expert, researcher or project manager in totally more than 20 projects, by promoting inter-disciplinary, international cooperation by important contribution to improvement of the education system of Latvia. Conducted courses are related to development of innovative products and business. The latest findings and the most relevant scientific research in the mentioned field are integrated in the study process. (Innovative Product Development and Entrepreneurship, Fundamentals of Law)

Larisa Iļinska, Dr. philol., professor, RTU, Faculty of E-Learning Technologies and Humanities, director of the Institute of Applied Linguistics, Head of the Department of Special Use Languages. Academic and scientific work in the higher education institution has been performed since 1993, specialising in linguistics and literary studies, applied linguistics. Work experience is based on more than 55 scientific publications. Expert rights of the Latvian Council of Science in the sub-field of Linguistics and Literary Studies of the field of Humanities and Arts. The conducted study courses are related to English, French, German, Chinese and other languages and technical translation. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Regularly supervises graduation papers in professional Bachelor's and Master's studies. Has developed learning and methodological tools. Chairperson of the Scientific Committee of the Scientific Conference "Meaning in Translation: Illusion of Precision". Regularly participates and reports at international scientific conferences. She is a member of the FELTH Council and the Council of the Institute of Applied Linguistics. (The Latvian language for foreign students, The English Language, The German Language, The French Language)

Andra Blumberga, Dr. sc. ing., professor, RTU, Faculty of Electrical and Environmental Engineering, Department of Energy Systems and Environment. Expert with extensive experience in the field of energy efficiency and system dynamics of buildings with more than 25 years of professional experience. She has worked as Head of the Ventilation Department at ABB Latvia, later as a managing director and energy consultant and she has been in RTU academic staff for the last 20 years and since 2012 – the Deputy Dean of RTU Faculty of Electrical and Environmental Engineering in scientific work. Extensive experience gained in management and participation in many national and international projects in the field of energy and the environment. Co-author of 115 scientific publications available on Scopus database and her H-index is 17, the co-author of 4 patents. In the academic Bachelor's study programme "Environmental Engineering" she is

responsible for the implementation of the final project and the following Bachelor's level courses: "An Introduction to System Dynamics Modelling of Environment" and "Energy Audit", as well as participates as a scientific supervisor in the development of Bachelor Thesis. Expert of the Latvian Council of Science in Environmental Engineering and Power Engineering. (Environment and Climate Roadmap).

Nataļja Lāce, Dr. oec., professor, leading researcher, RTU, Faculty of Engineering Economics and Management. Elected positions at RTU: professor, branch: Economics and Entrepreneurship. Head of the Department of Corporate Finance and Economics; leading researcher in the field: Economics and Entrepreneurship. Expert of the Latvian Council of Science in Social Sciences Economics and Entrepreneurship and Political Science. (Accounting and Finances)

Sergejs Gaidukovs, Dr. sc. ing., professor, RTU, FMSAC, Institute of Polymeric Materials. Professional experience: academic and scientific work experience since 2010 in a higher education institution. Conducting of lectures, laboratory assignments and practical classes in the specialities of chemistry, chemistry technology material sciences, development and approbation of study materials. Supervisor of fundamental and applied research and development projects, as well as contractual research projects. Regular supervisor of the study graduation papers and PhD thesis. The scientific research interests are related to the polymers science: polymer chemistry, physical chemistry, technology and processing, polymeric composites, colloidal systems, soft matters, materials science and engineering. He prepares scientific publications and participates in scientific conferences on regular basis. Regular participation in Erasmus experience exchange of the academic staff at European universities. Regular participation in qualification improvement measures organised by RTU and other. Expert of the Latvian Council of Science in the fields of materials science, chemistry engineering and chemistry. (Basics of Materials Science)

Marina Platonova, Dr. philol., professor, leading researcher, RTU, Faculty of E-Learning Technologies and Humanities (FETH), Institute of Applied Linguistics. Author and co-author of several scientific publications, monographs and books, participation in many international conferences, congresses and forums. Member of the editorial board of scientific journals, head of international conference sections. Within the framework of the professional master's and bachelor's study programme "Technical Translation", the developer and manager of the study programme; Within the FETH academic master's study programme "Digital Humanities"; RTU engineering bachelor's, master's and doctoral students. Organizer of various research seminars on terminology, semantics, pragmatics and comparative linguistics for RTU FETH Institute of Applied Linguistics lecturers and students. (The Terminology Minimum in English)

Inta Volodko, Dr. math., professor, RTU, Faculty of Computer Science and Information Technologies, Institute of Applied Mathematics, Department of Engineering Mathematics; head of the department. Academic and scientific work in the higher education institution has been performed since 1996, specialising in mathematics, mathematic physics. Work experience is based on more than 60 scientific publications. Regular attendance and presentation of reports at international scientific conferences. Conducted study courses are related to mathematics. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. The author of several study and methodological aids. She is the supervisor of three (3) PhD thesis. Regular participation in international (FP7, ESF) and national scientific and research projects. She is a member of the FCSIT Science Committee, the secretary of the RTU Council of Mathematics Professors, a member of the Council of the Institute of Applied Mathematics, a member of the FCSIT Council, a member of the RTU Constitutional Assembly, a board member at the Latvian Association of Scientists and the Latvian Mathematics Association. Regularly participates in professional development and training seminars. (Mathematics)

Modris Dobelis, Dr. sc. ing., professor, leading researcher, RTU, Faculty of Civil Engineering, Department of Computer Aided Engineering Graphics; head of the department. Work at RTU since 1996 until now. From January to June 2011, he was a Visiting Professor of Education and Research at North Carolina State University, Raleigh, NC with a Fulbright Scholarship. Carries out training of students, organization of the work of the department and research in connection with the implemented study courses in the field of Computer Aided Design (CAD), Descriptive Geometry and Engineering Graphics. (Descriptive Geometry and Engineering Graphics)

Andris Ozols, Dr. habil. phys., professor, leading researcher, RTU, FMSAC, Institute of Technical Physics, Department of Optics; head of the Department. Chairman of the RTU Council of Professors in the field of Natural Sciences, Physics and Astronomy. Member of the RTU Promotion Council of Material Science P-18. Corresponding member, Academician, Supervisory Council Member of Latvian Academy of Science. Member of Latvian Council of Science. Member of the editorial board of the "Latvian Journal of Physics and Technical Sciences". (Physics)

Jeļena Malahova, Dr. oec., associated professor, RTU, Faculty of Engineering Economics and Management, Institute of Labour Protection and Civil Defence. Professional experience: since 2011 the deputy Director of RTU FEEM ILPCD in study matters. Research components in work with students are provided by active participation in seminars of qualification improvement, participation in scientific conferences and development of publications. Active involvement in various projects and contracted scientific assignments. Within the study process, students acquire topical information in compliance with Cabinet Regulations of the Republic of Latvia No. 716 “Minimum Requirements for the Content of the Mandatory Course in Civil Protection and the Content of Training of Employees in Civil Protection”. Expert of the Latvian Council of Science in the science field of social sciences- economics and business. (Civil Defence)

Oksana Pavļenko, Dr. sc. ing., associate professor, RTU, Faculty of Computer Science and Information Technology, Department of Probability Theory and Mathematical Statistics. Elected positions at RTU associate professor in the field: Mathematics. (Probability Theory and Mathematical Statistics).

Gunārs Ozolzīle, Dr. sc. soc., associated professor, RTU, Faculty of E-Learning Technologies and Humanities, Institute of Humanities, the Department of Social Sciences; head of the department. Professional experience: teaching of social sciences (sociology, politology and the Latvian political system) at RTU and other higher education institutions of Latvia (LU, LSA, Police Academy of Latvia, Business Management College and the Institute of Social Technologies) as from 1989; the chairman of the State Examination Commission of the Faculty of Economics and Society Development of the Academy of Agriculture of Latvia in the Bachelor and Master study programme "Sociology of organisations and society governance” (as from 2005). Researcher at the market and public opinion research firm (SIA) Baltic Study Centre (1991–2018). The research link with students is also provided by the scientific research work, in projects funded by the Ministry of Defence of the Republic of Latvia and EU, participation in conferences and development of scientific publications. Scientific research activity is mainly related to the investigation of the stability and efficiency of the Latvian political system and the possibilities of reforming individual political institutes. This research direction allows improving the quality of the conducted study courses and providing the link with the current political processes in the country. The regular methodological work, in particular, development of study aids and other methodological materials, also helps improving efficiency of the study work. (General Sociology, Sociology of Personalities and Small Groups, Politology, Political System of Latvia)

Valentīna Urbāne, Dr. chem., associated professor, researcher, RTU, Faculty of Engineering Economics and Management, Institute of Occupational Safety and Civil Defence. Academic and

scientific work in the higher education institution has been performed since 1995, specialising in economics and business, business management. Work experience is based on more than 35 scientific publications. The rights of an expert of the Latvian Council of Science in the sub-branch of social and economic geography in the field of social science. Conducted courses are related to labour and environment protection. The author of several study and methodological aids. Regularly supervises graduation papers in professional engineer, Bachelor's and Master's studies. She has been presenting reports at international scientific conferences, participating in organisation commissions of conferences and leading sections. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. (General and Occupational Safety)

Ilze Judrupa, Dr. oec., associate professor, researcher, RTU, Faculty of Engineering Economics and Management, Department of Territorial Development Management and Urban Economics. Elected positions RTU: researcher in the field: Economics and Entrepreneurship; associate professor in the field: Economics and Entrepreneurship; expert of the Latvian Council of Science, expert rights in the field: Economics and business. (Economics)

Daina Ose, Dr. iur., assistant professor, RTU, Faculty of Engineering Economics and Management, Department of Innovation and Business Management. From February 8, 2012 – the Saeima of the Republic of Latvia, Legal Bureau, legal adviser. Sworn advocate, LU, Faculty of Law, freelance lecturer, lecturer, assistant professor. 1992 – 2002, State Riga company (VRU) "Kompresors", lawyer (Fundamentals of Law, Legal Regulation of Entrepreneurship)

Rita Greitāne, Dr. oec., assistant professor, researcher, RTU, Faculty of Engineering Economics and Management, Department of Corporate Finance and Economics. Elected positions at RTU: assistant professor in the field: Economics and Entrepreneurship; researcher in the field: Economics and Entrepreneurship. (Organization and Management of Market)

Aleksejs Šņitņikovs, Dr. sc. soc., assistant professor, RTU, Faculty of E-Learning Technologies and Humanities, Institute of Humanities, the Department of Social Sciences. Pedagogical experience gained by conducting study courses in bachelor's and master's study programs at RSU and RTU. He has obtained extensive professional experience in the field of sociological research by working at the Institute of Philosophy and Sociology of the University of Latvia (eight years), by participating in both fundamental and business projects. He has obtained research experience in the field of consultation by cooperating with private research companies (SIA "SAFEGE Baltija"), including in policy assessment projects, by assessing the state administration policy and efficiency of use of EU funds. In the process of development of his PhD thesis, he has had internship at Copenhagen Business School (2010–2011). He has been at Copenhagen Business School within the framework of Erasmus mobility programme. His research interests are related to sociology of organisations, research results are used in development and implementation of the study course. (Sociology of Management, United Europe and Latvia)

Zoja Veide, Dr. sc. ing., assistant professor, RTU, Faculty of Civil Engineering, Department of Computer Aided Engineering Graphics. Scientific work, field: descriptive geometry, engineering graphics, computer graphics, augmented reality technologies. Teaching and research work, field: Descriptive geometry, engineering graphics, computer graphics. Visiting Assistant Professor at the Latvian Maritime Academy. (Descriptive Geometry and Engineering Graphics)

Anna Borisova, Dr. chem., assistant professor, RTU, FMSAC, Institute of Polymer Materials, Department of Polymer Materials. Academic and scientific work in the higher education institution has been performed since 2013, specialising in materials science, polymers and composites. Work experience is based on regular scientific publications. Conducted study courses are related to production and processing, textile chemistry, finish of textile materials, printing theory and

technology, dyeing and finish of textile materials. Regular supervisor of graduation papers for students of the Bachelor and Master level. Participation in national and international education and research projects. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. She has worked as a forensic expert in the Department of Document Expertise of the State Forensics Office of the Ministry of Justice of the Republic of Latvia. She has been an invited expert in the Council of Forensic Experts of the Republic of Latvia. An associate member of Society of Dyers and Colourists (Bradford, UK). She is a reviewer in the scientific journal Coloration Technology. The author of the RTU patent “Method of finish of textile materials of various fibre containing celluloses". Regular attendance of the RTU courses for improving the teaching qualification and other courses. (Textile Chemistry, Finishing of Textile Materials)

Līga Ramāna, Dr. math., assistant professor, RTU, Faculty of Computer Science and Information Technology, Institute of Applied Mathematics, Department of Engineering Mathematics. She has been performing academic and scientific work at the higher education institution since 1989 in the field of mathematics (applied mathematics and mathematic simulation, modern elementary mathematics). Her work experience is attested by regular preparation and publication of scientific publications. Conducted study courses are related to mathematics. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Regularly participates in professional development and training seminars. (Mathematics)

Dina Baumane, Mg. art., assistant professor (practical), RTU, Faculty of Architecture, Department of Fine Arts. Academic and scientific work in the higher education institution has been performed since 2013, specializing in fine arts. The conducted study courses are related to the basics of fine arts, the basics of graphic analysis, painting and drawing, painting workshops for textile designers. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Regularly participates in conferences related to education and art. She has organized solo exhibitions of her creative works, regularly actively participates in group exhibitions, as well as has organized exhibitions of student works. Regularly participates in RTU-organized, as well as other professional development events. (Fundamentals of Fine Arts)

Silvija Rēvele, MBA, lecturer, RTU, International Cooperation and Foreign Students Department. Lecturer, project manager, Faculty of Engineering and Management, Institute of Building Entrepreneurship and Real Estate Economics. (General Sociology, Sociology of Personalities and Small Groups)

Jānis Bartušauskis, Master degree in Occupational Safety, lecturer, RTU, Faculty of Engineering Economics and Management, Institute of Occupational Safety and Civil Defence; research assistant in the field: Social and Economic Geography (Environmental Management). (Civil Defence)

Aleksandrs Beznosiks, Mg. art., lecturer, RTU, Faculty of Architecture, Department of Fine Arts. Working as a designer in development of design projects and supervision of their implementation. He conducts the study course "Basics of fine arts". He has participated in the role of a designer and an implementation supervisor in implementation of several interior and architecture projects (“Project of reconstruction of the premises of the museum of the RTU Faculty of Electronics and Telecommunications and Implementation Supervision”, “Project of the memorial exposition of the Archbishop Jānis Gerklavs and Senior Priest Sergejs Garklāvs”, “Project of improvement of the entrance hall of the RTU Faculty of Electronics and Telecommunications"). He has regularly participated in exhibitions with his creative works (2003–2015), he has had several publications of creative works in the interior magazine Deko (2003–2008). He has received several awards for developed graphic design works. (Fundamentals of Fine Arts)

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the 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 may be additionally specified (if applicable).

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).

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

The academic personnel of the study programme actively participates in scientific research. This allows continuous improvement of the quality of the study work by incorporating the most recent research results in study courses. The obtained experience and knowledge allows improving the competences of professors, as well as provides an opportunity to enrich the discussions in the classroom and to provide knowledge on topical issues in the global textile industry to students.

The *academic staff of the study programme work as experts of the Latvian Council of Science (LCS*): **I. Baltiņa, D. Beļakova, I. Dāboliņa, A. Okss, U. Briedis** are experts in the sub-branch of materials sciences of the branch of engineering science and technology; ***J. Blūms*** - in the sub-branch of physics of the branch of physics and astronomy; ***S. Gaidukovs*** - in material science in the branches of chemistry engineering sciences and chemistry; ***A. Blumberga*** - in environment engineering and energy; ***J. Malahova, V. Jemeļjanovs, V. Urbāne*** - in the sub-branch of social and economic geography of the branch of social science; ***J. Malahova*** - also in economics and business; ***N. Lāce, E. Gaile-Sarkane*** - in economics and business, in the politics science; ***I. Judrupa*** - in economics and business.

The academic staff ***I. Baltiņa, I. Ziemele*** work in the council of industry experts, in the council of experts of the branch of textile products, clothing, leather and leather products as invited experts.

The *research areas of the DCTT* profiling the study program are targeted at the needs of the society and institutions. They are related to design of smart and functional textiles and clothing, as well as development of prototypes, research of the clothing comfort and fit, recycling of textiles and minimisation of the environmental impact.

By promoting the growth and academic excellence of RTU personnel, *the academic staff and*

researchers of DCTT have participated in international projects on various levels during the report period:

- from 01.01.2010 to 31.12.2013 the fundamental and applied research project of the Latvian Council of Science "Research of the properties of Latvian renewable raw materials - lax and hemp, their application for development of innovative technologies and new functional materials" was implemented. The project partners are the RTU Institute of Polymer Materials, the Institute of Solid State Physics and the Institute of Biology of the University of Latvia and Latgale Agriculture Science Centre. Research for identification of the properties lax and hemp fibre, production and testing of samples of technical textiles was performed to expand the application of natural fibre materials. ***I. Baltiņa, D. Beļakova, I .Ziemele*** were involved in the project as researchers. The information gained in the project is applied in the study courses "T*extiles Development*" and "*Production of Technical Textiles*";
- 01.03.2016 - 01.03.2019, the international research project No. R006 of the inter-regional cooperation program INTERREG, European Union Structural Funds Objective 3 of "European Territorial Cooperation" programme "*Smart and Safe Work Wear Clothing*" was implemented. Research groups of five universities of the countries of the Baltic region and businesses participated in the project. The project was aimed at adaptation of the production orders and integration of IT technologies in the work-wear clothing, as well as improvement of the management of the supply chain. The scientific supervisor of the project at RTU ***I. Dāboliņa***, involved academic staff: ***I. Baltiņa, D. Beļakova, L. Siliņa, E. Lapkovska, J. Dāboliņš***. The project topics was also developed in the graduation papers of students (Z. Lucāne, I. Skrinda). The information obtained within the project is applied in implementation of several study courses, namely, "*Basics of Anthropology for Clothing Studies*", "*Garment Style Creation*", etc.;
- 01.03.2017 - 31.12.2019, ERDF project "*Synthesis of textile surface coating modified in nano-level and energetically independent measurement system integration in smart clothing with functions of medical monitoring*", No. 1.1.1.1/16/A/020 was implemented. The project was implemented in cooperation with the Institute of Biomedicine Engineeing Sciences and Nano-technologies of RTU and the Institute of Technical Physics of RTU. The academic staff involved in the project: ***I. Baltiņa, U. Briedis, D. Beļakova, I .Ziemele, A. Okss***. The Bachelor's thesis of the students of the study programme were developed during the project implementation (I. Glazīrina, V. Ladika). The academic staff of DCTT performed the research part related to development of smart electronic system and their integration in clothing, as well as identification of quality requirements for the clothing prototypes. The information obtained in the project is applied in the study courses "*Technical Textiles*", "*Clothing Quality Control*", "*Machine Embroidering*".
- 01.12.2018 - 28.02.2021, in cooperation with partners from Spain, Portugal, Romania, Belgium, Macedonia, the*ERASMUS+ project* "*Innovative Design Practices for achieving a New Circular Textile Sector. Design4Circle"* was implemented. The supervisor of the RTU project part ***D. Beļakova***. Involved academic staff ***G. Terļecka I. Dāboliņa, I. Baltiņa, E. Lapkovska, L. Siliņa, J. Dāboliņš***. Within the project new digital teaching aids were developed which can be used by the students of the study programme by learning matters related to the sustainability of designed textiles and their production processes.
- 01.11.2017 - 30.04.2020, in cooperation with partners from Portugal, Spain, Greece and Romania, *ERASMUS+ project* "*Circular Economy Innovative Skills in the Textile Sector. ECO-TEX*" was implemented. Within the project the analysis of the needs of textile manufacturing was performed for introduction of the circular economy business model in the textile industry. The supervisor of the RTU project part ***D. Beļakova***. *Involved academic staff* **G. Terļecka,I. *Dāboliņa, I. Baltiņa, I. Ziemele, E. Lapkovska, L. Siliņa, J. Dāboliņš***.

Within the project the competences needed for the new industry professionals were identified.

The academic staff of DCTT regularly participate in scientific conferences related to the development of the study direction and the study programmes (see the summary in Chapter 4.4 of Section II). The academic staff of the department have presented research work in 147 publications in the report period. Jointly with the academic staff of the other structural units implementing the Bachelor's study programme subject to the review, 474 publications were prepared during the report period and these were cited in data basis Scopus - 391 instances and Web of Science - 211 instances (see Annex 13 of Section II).

The academic staff review scientific publications for international journals. ***A. Viļumsone*** reviewed the article *"Nanodiamond Composite As Smart Coating for Textile Fabrics"* in the journal *Journal of Industrial Textiles*. ***I. Dāboliņa*** is a reviewer of scientific articles for the journal "Measurement", included in the reviewing system in the publishing house "Elsevier". ***I. Baltiņa*** has reviewed scientific articles in the following journals: *Textiles and Light Industrial Science and Technology*; *Journal of Industrial Textiles; Cellulose*. I. Baltiņa has also been a member of the science council of the 19th international scientific conference "AUTEX 2019". ***I. Ziemele*** reviewed a scientific article in the journal ***"***Tekstilec" (Slovenia) and has been a member of the science committee and a reviewer of articles of the international scientific conference "AUTEX 2017".

The academic staff of DCTT is involved in the promotion and habilitation councils of other higher education institutions are experts of the relevant science fields. During the reporting period, professor **A. Viļumsone** was a member of the habilitation commission of associate professor Dr. A. Rudolf of the University of Maribor. Associate professor ***I. Dāboliņa*** performed the duties of the official opponent during the pre-defence of the Ph.D student of Buros Textile University N. Hernandez on 27 April 2018 in Buros, Sweden.

By performing research projects, preparing publications, attending conferences and working on the promotion councils of other higher education institutions, the academic staff continuously develop their professional competence and stay well aware of the topical research areas in the clothing and textile industry, which is reflected in the topics and the quality of the graduation papers of students supervised by them. In the textile materials research laboratory *contracted research projects were performed* in 2017 under supervision by ***I.Baltiņa*** for the needs of the Procurement Command of the National Armed Forces of the Republic of Latvia and the Ministry of Defence of Latvia: "Investigation of the base fabric of the daily uniform jacket and development of specification", "Development of the technical specification of the fire-resistant 4th level action jacket" and "Investigation of the fabric of trousers and jackets of the 4th level action of the National Armed Forces and preparation of the specification". The results of developments have been used for providing a practical example to students regarding the requirements set for the raw materials of the functional clothing, The students use the obtained information for developing the study project "*Clothing materials sciences*". In cooperation with industrial undertakings *practical research projects have been performed*: In 2014 –2015, the contracted research project was performed for the undertaking „Tonus Elast" Ltd. (***I. Baltiņa***), within which the maintenance of the properties of compression products under high and low temperature and humidity was investigated. In 2018 a contract project with "New Rosme" Ltd. (***D .Beļakova***), "Examination of the labour intensity of products".

The academic staff of DCTT (***A. Kalnāja I. Baltiņa, D. Beļakova, I. Ziemele, U. Briedis****),* within the project of the European Social Fund No.8.5.2.0/16/I/001 "Improvement of the industry qualification system for development of the vocational education and provision of quality" implemented by the State Centre of the Education Content of Latvia, during the period from

01.01.2017 to 30.12.2020, developed the digital teaching aid for vocational technical education institutions "*Production of sewn products*". It is successfully used also in practical classes in the study courses "F*undamentals of Garment Patternmaking and Technology", "Basic Principles of Textile Technologies*" and "*Modular Fabrication of Garments*". Within the same ESF project No.8.5.2.0/16/I/001, in the period from 16.04.2018 to 11.03.2019, within the activity "Development of modular vocational education programs for the professional qualifications of the industry of manufacturing of textile products, clothing, leather and leather products", the academic staff developed modular education programs for the qualifications of the modular education program "Professional of garment design and construction", "Professional of production of leather and fur products", "Operator of sewing machinery".

During the report period, the academic personnel of IDT developed the practical assignments of the competition of young professional organised by the SEDA "*SkillsLatvia 2018*" and participated in the evaluation as the commission heads and members ("Production of garments", ***D. Beļakova, I. Ziemele***).

The professors of IDT have participated in development of methodological materials, thus supplementing the offer of literature for acquisition of the study programme:

- *Methodology of work standisation*. Māris Saulītis, ***Dana Beļakova, Inese Ziemele*** - Riga: Latvian Confederation of Employers, 2013

- Šipkovs, P., Ivanovs, S., Kukle, S., Kaškārova, G., Ruciņš, Ā., Ļebedeva, K., Migla, L., ***Beļakova, D.,*** **Vidzickis, R., Kirilovs, E.**, Borodiņecs, A., Lekavičius, V., Pelēce, I., Valainis, O., Šipkovs, J., **Šahta, I., Kašurina**, I., Snegirjovs, A. *Innovative technologies for production of heat and cold and production of new products by using local renewable energy resources*. Riga: 2015 108 p. ISBN 978-9934-14-646-6.

4.6. 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 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).

In order to achieve the learning outcomes of the study programme, the interconnection of study courses and their sequential and logical acquisition is of great importance. The structure, content and mutual links of the study courses are created in accordance with the goal of the study programme and the Standard of Occupation "Clothing and Textile Production Engineer", thus it is sequential, ensuring the acquisition and supplementation of the knowledge, skills and competencies necessary for the young professional.

Theoretical study courses are most often linked to practical or laboratory assignments to strengthen and supplement the acquired knowledge. Also the study courses to be completed in sequence are mutually linked to prevent overlapping of the content and to minimise the possibility that there are any omitted topics. The link is formed by the content to be acquired and the assignments to be completed by a student.

The system of cooperation and qualification at RTU provides regular academic conferences and professional growth workshop training for improvement of methodological competences (https://estudijas.rtu.lv/course/view.php?id=57106). The following examples can be mentioned:

The academic conference of 27 April 2018 “Integration of the study methodological and scientific work in the study process”. Such events contribute to the professional improvement of lecturers and allows more efficient cooperation for attainment of results and improvement of study courses. At the meetings of DCTT of every semester, the results of the students’ session, the problematic issues of implementation of the study program and the results attained in the study process are assessed. The department meetings with the presence of all the academic staff take place regularly every month and topical issues of the study process are discussed and resolved there. The questionnaires filled by students regarding the quality of implementation of study courses play an important role in this process. Solutions are found jointly according to the current situation. For example, adjustments are made in the structure of individual study courses to avoid overlapping of topics and to improve the mutual link of study courses. Changes in the content of the study programme are proposed and implemented by introducing new study courses. In such cases proposals are assessed by the commission of the study direction “Manufacture and Processing”, it adopts a decision and submits it for review at the Faculty Council.

The ratio of the number of students and professors in the professional Bachelor’s study programme “Clothing and Textile Technology” in Latvian is 2.6:1 and the ratio of students and professors in the study programme “Clothing and Textile Technology” (in English) is 1:10 as on 30 January 2021. This ratio encourages good individual communication between students and professors, thus enabling efficient study work. However, a part of study courses, mainly general education study courses, are implemented in groups together with students of other groups and study programmes, therefore the actual number of students per professor is slightly higher.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	Annex_1_1_annex_Statistical_data_on_students_.pdf	1_1_pielikums_Statistikas_dati_par_studejosajiem_.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	Annex_2_1_Compliance_with_education_standard_.pdf	2_1_pielikums_Atbilstiba_valsts_izglitibas_standartam.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)	Annex_2_3_Compliance_with_standard_of_occupation.pdf	2_3_pielikums_Studiju programmas_atbilstiba_profesijas_standartam.pdf
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_1_2_Mapping_of_the_study_courses.pdf	1_2_pielikums_Studiju_kursu_kartejums.pdf
Curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex_2_2_Plan_of_the_study_programme.pdf	2_2_pielikums_Studiju_programmas_plans.docx
Descriptions of the study courses/ modules	Annex_2_4_Description_of_the_study_courses.zip	2_4_pielikums_Studiju_kursu_apraksti.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	Sample_of_Diploma.zip	Diploma_paraugs.zip
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Vienosanas_ar_LLU_01000-4.1-e_53.edoc	Vienosanas_ar_LLU_01000-4.1-e_53.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	Par_zaudējumu_kompensāciju.edoc	Par_zaudējumu_kompensāciju.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.	02000-2.2.1-e_97 - svešvalodu prasme.edoc	02000-2.2.1-e_97 - svešvalodu prasme.edoc
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education		
Sample (or samples) of the study agreement	Sample_of_study_agreements.zip	Studiju_liguma_paraugi.zip
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.		

Fibre Materials Science (51548)

Study field	*Manufacture and Processing*
ProcedureStudyProgram.Name	*Fibre Materials Science*
Education classification code	*51548*
Type of the study programme	*Doctoral study programme*
Name of the study programme director	*Inese*
Surname of the study programme director	*Ziemele*
E-mail of the study programme director	*Inese.Ziemele@rtu.lv*
Title of the study programme director	*Dr.sc.ing.*
Phone of the study programme director	*+371 26131751*
Goal of the study programme	*Promotion of development of the textile and clothing technology sub-field, wood materials and product technology sub-field of the materials science field and related fields of the national economy in the region by training top qualification professionals of international level for independent scientific work in research, design and development of innovative and traditional fibre materials and their products and introduction of relevant technologies, as well as academic work in higher education institutions for regular renovation of the teaching staff, thus ensuring the generation cycle in the materials science field as a whole.*
Tasks of the study programme	*- Ensuring of attaining the study goal by providing opportunities to acquire in-depth knowledge, skills, and competences for carrying out independent scientific research work:* *- development of students' competences to propose, define, manage and independently research topical and important issues in the relevant sub-field of the science;* *- to provide top level selected knowledge in the science of fibre materials and related technologies;* *- development of competences to perform independent scientific research work on the selected topic in the sub-fields of the materials science;* *- development of skills to prepare scientific articles and reports, stand and verbal report presentations at international conferences for presenting the results of the research work to the public on the national and international scale;* *- development of skills and competences to participate in implementation of national and international science projects;* *- development of the ability to plan and to implement scientific research projects;* *- development of the ability to improve teaching skills and experience for academic work at higher education institutions;* *- provision of opportunities for the new researcher to develop and submit for defence the Ph.D. thesis or a comparable set of scientific publications on the same topic as original research for obtaining the Ph.D. degree.*

Results of the study programme	*A graduate of a Ph.D. study program:* *- knows and understands the latest scientific theories and findings, is familiar with research methodologies and modern research methods in the textile and clothing technology sub-field, wood materials and product technology sub-field of the materials science field, as well as in the professional area of relevant industries and interaction of the fibre materials science areas;* *- can independently assess and select methods suitable for scientific research of fibre materials and their products to expand the limits of knowledge or provide new understanding to the existing knowledge of fibre materials and their practical application;* *- can implement original research of fibre materials and their products of a substantial scope and to approbate the research results on the level of internationally cited publications;* *- can communicate both verbally and in writing on the area of the fibre materials science with broader scientific community and the society in general by presenting at domestic and international scientific conferences;* *- can independently improve own scientific qualification, implement science projects by attaining the results conforming to the international criteria of the materials science field;* *- can lead research or development projects in undertakings, institutions and organisations by applying broad research knowledge and competences on fibre materials, their products and modifications;* *- can resolve important research or innovation tasks by performing independent critical analysis, synthesis and assessment, independently propose the research idea, plan, structure and manage large scale scientific projects, including international projects;* *- can manage and implement the academic process by developing study courses, implementing, and evaluating the study content.*
Final examination upon the completion of the study programme	*The final examination is defence of the Ph.D. thesis or a comparable set of scientific publications on the same topic at the promotion council.* *The Ph.D. degree is conferred for an independently developed Ph.D. thesis or a comparable set of scientific publications on the same topic containing scientifically original, verified results, and providing new knowledge in the relevant sub-field of the materials science. The conformity of the Ph.D. thesis is assessed by the State Scientific Qualification Committee, experts of the Latvian Council of Science and the Promotion Council of the relevant science field, considering the following criteria:* *• whether the scientific work is a completed study with sufficient scientific novelty, relevant content and scope;* *• whether modern analysis and data processing methods are applied in the work;* *• whether the research of the scientific work has been published in peer-reviewed international science publications;* *• whether results of scientific research have been presented at international scientific conferences (workshops).*

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)	*192*
Admission requirements (in English)	*Master's degree in Engineering or a comperable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of science (Ph.D.) in materials science*
Qualification to be obtained (in english)	—

Places of implementation

Place name	City	Address
Riga Technical University	RĪGA	KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050

III - DESCRIPTION OF THE STUDY PROGRAMME (1. Indicators Describing the Study Programme)

1.1. Description and analysis of changes in study programme parameters that have taken place since the issue of the previous accreditation certificate of study direction or the license of study programme if study programme is not included in the accreditation page of the study direction

Several changes of the parameters of study programs have been implemented.

No.	Parameter	Change analysis
1.	Title of the study program	In order to secure the mutual link of the title, goals, objectives, content of the Ph.D. study program implemented by the Institute of Design Technologies of the Faculty of Materials Science and Applied Chemistry of Riga Technical University, the Ph.D. degree in the sub-fields of the materials science and the admission requirements, the title of the study program was changed from "Clothing and Textile Technology" to "Fibre Materials Science" by the resolution of Senate of RTU at the meeting on 26 April 2021 (Minutes No. 649).
2.	Education classification code of the Republic of Latvia	51548
3.	Head of the study programme	Inese Ziemele, the lecturer of the study program for many years, has been leading the study program since February 2018 following retirement of A. Viļumsone, the preceding program director.
4.	Goal of the study programme	The goal has been expanded and updated taking into account the requirements of the competence education, changes in the demand of the modern labour market, topicalities in the development of the textile and clothing technology sub-field, wood materials and product technology sub-field of the materials science field and related industries of the national economy in the region.
5.	Objectives of the study programme	The objectives have been updated taking into account the requirements of the competence education, topicalities in the materials science and national economy.
6.	Study results to be attained	The results of the study program have been updated to reflect the current essence of study program and to attest its conformity to the requirements of LQL/EQL 8, the requirements of the field of the materials science and to the professional areas of the relevant sub-fields.

No.	Parameter	Change analysis
7.	Final examination envisaged at the completion of the study program	In compliance with the rules of procedure of the new promotion council RTU P-02, the final examination envisaged at the completion of the study program has been updated.
8.	Degree to be conferred	In compliance with the Law on Scientific Activity, Cabinet Regulations No. 1001 (27 December 2005) "Procedures and Criteria for the Conferral of a Doctoral Degree in Science (Promotion)" and according to the Regulations of Promotion Council of the Materials Science Field RTU P-02 (approved at the meeting of the Senate of RTU on 30 March 2020, Protocol Resolution No. 638), the Ph.D. degree in the materials science is conferred.

Several changes in study courses have been implemented:

In Part A, compulsory study courses, the study course "Research Methodology" has been restored by expanding its scope and splitting it in two parts, thus providing an opportunity for Ph.D. students to study in-depth modern research equipment and methods. A professor of the Institute of General Chemical Engineering of the Faculty of Materials Science and Applied Chemistry (hereinafter referred to as the FMSAC) has been recruited for teaching the study course. The study course "Investigation of Consumer Goods Materials" has been replaced with a study course "Fibre Materials Science" where it is envisaged to cover the basic types of fibre. Three professors have been recruited for the study course by splitting their scientific activity areas, in particular, science of fibre materials containing lignin, science of textile fibre materials and science of polymeric fibre materials. A professor from the Department of Polymer Materials Technology of the FMSAC has been involved in teaching the study course. In order to develop a particular way of thinking of Ph.D. students, to teach a set of specific methods for generating creative alternatives in research, identifying issues, producing solutions in cooperation with users, prototyping and testing of developments, as well as introduction and continuous improvement of solutions, a new study course "Design Thinking in Engineering Sciences" has been introduced in the study program and it will be taught by the new scientist, the leading researcher of the Research Laboratory of Functional Materials Technologies of the FMSAC, who has the Dr.sc.ing. and the Master degree in the material design.

The study course "Teaching Assistant Practice in Speciality" has been moved from Part A, compulsory study courses, to Part B, restricted elective study courses. A range of changes has been implemented in Part B of this study program, in particular, the study course "Research Seminars in Specialization" has been replaced by the course "Special Course of the Research Direction" providing for in-depth theoretical and practical training in the field of research of the Ph.D. thesis for a Ph.D. student. By following novelties in the development of fibre materials and their products, the following new study courses have been added: "Development and Research of Smart Textiles"; "Advanced Textile Technologies"; "Specialized Bio- and Nanotechnologies"; "Functional and Smart Clothing Development and Research"; "Clothing Comfort"; "Wood Processing Technologies and Creative Design"; "Conceptual Models of Fibre Materials and Product Design". The study courses "Design Research and Problem Solving", "Wood Science and Technologies", "Conceptual Models of Industrial Design" are excluded from the study program.

1.2. Analysis and assessment of the 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 in the different study forms, types, and languages.

In the beginning of the report period (academic years 2013/2014 - 2016/2017) the number of admitted students varied from 2 to 7 matriculated students, however, this has stabilised during the last four years. 3 students have been matriculated every academic year. During the report period, the total number of students in the study program has not decreased, there were 14 students in academic year 2013/2014 and the number is the same in academic year 2020/2021. In the beginning of the report period, the number of students was gradually increasing, and the highest number was achieved in academic year 2016/2017 when there were 22 students. The changes in the number of students are related to the beginning and end of the European financing support program for the Ph.D. level studies and also correspond to the number of graduates in the Master level and its changes. All the students have study places paid for from the state budget.

In the beginning of the report period (academic years 2013/2014 - 2014/2015) the number of graduates accounted for 19-36 % of students, during the period from academic year 2015/2016 - 2017/2018, there were no graduates, and starting from academic year 2018/2019 the number of graduates accounts for 5-7 % of students or 1 graduate per year on average. Totally 10 new Ph.D. holders have graduated from the study program during the report period (Annex - List of Alumni).

The number of students on an academic leave has been fluctuating from between 17-44 % of the total number of students during the report period, reaching the highest number in academic year 2019/2020. The main reasons were a child-care leave, health issues and the inability to combine Ph.D. studies and employment.

The main reason behind drop-out of students is expulsion for a failure to resume studies following an academic leave (5-24 % during the report period), followed by expulsion based on the student's application (5-12 %) and expulsion because of failing study progress (5 – 14 %). The analysis of the students' dropping out has revealed that the reason is various external circumstances, like, a repeated child-care leave, employment obligations and lack of time, as well as health issues.

The number of admitted students is stable, reaching minimum 3 students starting studies per academic year, still the change of the number in different study years fluctuates, considering the students' academic leaves, their duration or opting not to resume studies after the academic leave due to various reasons.

Continuation of studies is encouraged by the possibilities to receive the RTU Ph.D. financial support, i.e., a Grant which can be used as a wage or for research needs, publication expenses and improvement of competences. Since 2015 the Ph.D. Grant has been received by 11 students, moreover, some of them have received and used it multiple times.

Also, since 2019 considerably funding has been attracted within the scope of the ESF project SAM 8.2.2.0/18/A/017 "Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas", the areas eligible to receive support there include involvement of Ph.D. students to work at a higher education institution providing for employment according to the employment conditions of the academic staff, encouragement of submission of the Ph.D. thesis and receiving the first Ph.D. scientific degree and support in scientific activity. 4 Ph.D. students have been involved in the project since 2019, who plan to submit their Ph.D. thesis for public defence

and to receive the first Ph.D. scientific degree until 31 May 2022.

Statistics data on changes in the number of students, number of graduates, as well as the drop-out of students and reasons behind it are attached in Annex 1.

1.3. Analysis and assessment of the interrelation between the name of the study programme, the degree or professional qualification to be acquired or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements.

The Ph.D. study program "Clothing and Textile Technology" is implemented by the RTU FMSAC Institute of Design Technologies (hereinafter referred to as the IDT) (the name has changed during the report period from the preceding name "Institute of Textile Materials Technologies and Design"). In compliance with the Classification of Science Branches in the Republic of Latvia, the study program comprises the textile and clothing technology sub-field and wood materials and product technology sub-field of the materials science field. The study program has been developed in compliance with the Law on Higher Education Institutions, the Law on Scientific Activity, Cabinet Regulations No. 1001 (27 December 2005) "Procedures and Criteria for the Conferral of a Doctoral Degree in Science (Promotion)" (Annex 2). It conforms with Regulations on Ph.D. studies of Riga Technical University. The study program is implemented in compliance with the research directions of RTU and IDT, and it is aimed at training a new generation of academic staff and researchers in compliance with Cabinet Ordinance No. 331 "Education Development Guidelines of Latvia 2014-2020". The study program is accredited until 30.06.2022, Accreditation Sheet No. 2020/44.

Ph.D. students specialising in the sub-fields of the materials science field, i.e., the textile and clothing technology sub-field or the wood materials and product technology sub-field or comparable engineering sub-fields study in the study program "Clothing and Textile Technology". Students possessing competences which, as developed by the studies, allow in-depth researching of various textile and clothing types, their technologies and traditional fibre materials, as well as smart and technical fibre materials, which are not restricted to only wood materials, but comprise also other ligno-cellulose fibre materials and user-focused fibre material products, are admitted to the Ph.D. study program. The updated content of the study program comprises research areas covering a broad range of fibre materials and their in-depth research by applying the design thinking knowledge.

In order to secure the mutual link of the title, goals, objectives, content, the Ph.D. degree in the sub-fields of the materials science and the admission requirements of the Ph.D. study program implemented by the IDT, it has been necessary to change the title of the study program from *"Clothing and Textile Technology"* to *"Fibre Materials Science"* during the accreditation process of the study direction "Manufacturing and processing". The resolution of the Committee of the Study Direction regarding the change of the title of the Ph.D. study program has been supported by the FMSAC Council and approved by the Senate of RTU resolution at the meeting of 26 April 2021 (Minutes No. 649). (Annex - *Senate of RTU*).

The new title of the study program corrects the information regarding the content of the study program and links it to the ***goal*** of the study program, i.e. promotion of the development of the textile and clothing technology sub-field, wood materials and product technology sub-field of the materials science field and related fields of the national economy in the region by training top qualification professionals of international level for independent scientific work in research, design

and development of innovative and traditional fibre materials and their products and introduction of relevant technologies, as well as academic work in higher education institutions for regular renovation of the teaching staff, thus ensuring the generation cycle in the materials science field as a whole. The ***objectives*** of the study program, which are set for attaining particular study ***results***, are subordinated to securing attaining of the defined goal and updated according to the changes (the parameters of the study program in Section 1.1).

Following successful completion of the studies, the Ph.D. scientific degree (the Ph.D. degree in materials science) is conferred for an independently developed Ph.D. thesis or a comparable set of scientific publications on the same topic containing scientifically original, verified results, and providing new knowledge in the relevant sub-field of the science.

A graduate of the study program, the new Ph.D. holder, can resolve topical theoretical and practical issues, solve important research or innovation tasks in the fibre materials science field, propose a research idea, plan, structure and manage large scale scientific projects, including international projects, as well as plan and independently perform teaching work. Graduates of the study program can work at higher education institutions, state administration authorities, scientific research institutions in the areas of production and design both on domestic and international scale.

The analysis of the mutual link between the title of the study program, the degree to be conferred, the goal and objectives, study results and admission requirements leads to the conclusion that is has been complied.

III - DESCRIPTION OF THE STUDY PROGRAMME (2. The Content of Studies and Implementation Thereof)

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In 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.

The topicality of the study program has been increasing rapidly during recent years, and RTU IDT feels it by receiving regular inquiries from Latvian undertakings, NGOs for new innovative, science-intense solutions on clothing, textile, wood and other fibre material and product design, the solution of which, by satisfying the growing public needs, is also important for securing the environmental sustainability.

Fibre materials and their products rank fourth as regards use of primary raw materials and water and fifth as regards emission of greenhouse gas emissions globally (Brussels, 11.3.2020, COM(2020) 98 final, A new Circular Economy Action Plan (europa.eu)), therefore promotion of the market of circulation of sustainable fibre materials and their products is among the EU strategic goals.

Within the implementation of the study program, its results to be attained provide for promotion of

development of clothing, textile, wood and other fibre materials products and technologies science fields and related economic industries in the region. The study program comprises several study courses, for example, "Fibre Materials Science", "Design Thinking in Engineering Sciences", “Development and Research of Smart Textiles”, "Specialized Bio- and Nanotechnologies"; "Functional and Smart Clothing Development and Research"; “Conceptual Models of Fibre Materials and Product Design”, “Wood Processing Technologies and Creative Design”, “Conceptual Models of Fibre Materials and Product Design”, whose completion allows successful performing of the research work according to priorities in the related industries of the national economy on the national and European scale. Study courses include topics related to implementation of the national scale research and innovation strategies for transformation of the national economy "Smart Specialisation Strategy (RIS3)" in research.

Upon admitting Ph.D. students for studies, *scientific supervisors of Ph.D. thesis ensure that the research topics conform with the national and EU research interests,* which is attested by the participation of many Ph.D. students in the implementation of various international projects (ESF, Interreg, Erasmus+). Ph.D. theses are developed and defended in priority science directions as defined by the state of Latvia (Cabinet Ordinance No.776, 13.12.2017), like “Research and sustainable use of domestic natural resources for the development of the knowledge-based bio-economy” and “Technologies, materials and engineering systems for increasing the value added of products and processes”.

The study program is unique on the Latvian scale, as it is the only one in the country providing advanced academic studies of the design of fibre materials, in particular, textile, wood, and other fibre materials. Conformity of the study program to the needs of the labour market and science trends is attested by the high and increasing demands for people possessing a Ph.D. degree in all industries of the national economy. (2EMZino_03062020; Ministry of Economy “Information Report on the Medium and Long-term Forecast of the Labour Market, 2020”, https://www.em.gov.lv/lv/media/598/download - available only in Latvian).

Graduates of the study program have successfully joined the labour market by commencing working during their studies, and following the graduation they work in research laboratories, state structural units, become recognised lecturers at higher education institutions and schools, as well as manage businesses in the national economy industries related to the science fields of the study program.

The Ph.D. degree is conferred:

- for an independently developed and defended Ph.D. thesis or a comparable set of scientific publications on the same topic containing scientifically original, verified results, and providing new knowledge in the relevant field of fibre materials of the materials science.
- the candidate for the Ph.D. degree has minimum one publication in an anonymously reviewed international publication indexed in Web of Science or SCOPUS data bases or included in INT1 or INT2 category journals of ERIH (European Reference Index of the Humanities) data base;
- modern analysis and data processing methods are applied in the Ph.D. thesis;
- the results of scientific research have been presented at international scientific conferences (workshops).

The above substantiates conferring of degrees based on achievements and knowledge in the relevant science branch.

2.2. Assessment of the interrelation between the information included in the study

courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In 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.

The content of the Ph.D. study program implemented by IDT and its implementation is based on the laws and regulations of the Republic of Latvia, RTU internal regulations and the principles of the Ph.D. education recommended by EUA (European University Association).

As regards its structure and content, the study program is targeted to attaining its goal which is closely related to the defined attainable study results of the study program. Study courses are developed to ensure that they mutually and sequentially supplement each other and direct the study process towards full-scope acquisition of the study program and attaining the envisaged results. The link between study courses and the study results of the study program is reflected by the mapping of the attainable results of study courses (Annex No. 3). A certain sequence is followed in planning implementation of study courses for successful attaining of the study program results. The plan of the study program is attached in Annex No. 4. Descriptions of study courses are collected in the uniform RTU Register of Study Courses and attached in Annex No. 5. The collection includes the descriptions of 3 compulsory study courses of the study program (Part A), the descriptions of 19 restricted elective study courses (Part B) and the description of one final examination (Part E).

The information contained in the study courses form a logical mutual link, ensuring growth of the knowledge and skills of students. ***During the first two study years,*** general competences for performing research work in the selected field are developed (the study courses “Research Methodology", "Fibre Materials Science", "Design Thinking in Engineering Science”), during further study years these are strengthened and developed in-depth by specialised study courses and during development of the scientific work. Minimum one scientific article is prepared or accepted for publication during the first study year. A Ph.D. student presents its results at an international or domestic conference. Scientific work is performed under supervision of a scientific supervisor.

As a Ph.D. student gains deeper insight of the theories of the relevant sub-field of the materials science and performs analytical and practical research, its results are published every study year. ***During the third study year,*** development of the science work reaches the level regarding which a Ph.D. student publishes minimum one scientific article in publications indexed in Web of Science or SCOPUS data bases or included in INT1 or INT2 category journals of ERIH (European Reference Index of the Humanities) data base;. International conferences are attended during the studies by presenting annual reports to provide the possibilities of knowledge and experience transfer. The readiness of the Ph.D. thesis reaches 70% at the end of the third study year.

During the fourth study year the concluding stage of research is carried out. A Ph.D. student presents the thesis of his/ her research and practical research at a pre-promotion exam. The work on scientific publications is continued, international cooperation of the new scientist is developed. The thesis is prepared for submission to the Promotion Council.

During all the study stages Ph.D. students are involved in the teaching work, thus ensuring transfer of accumulated knowledge, experience, and research on the level of Bachelor and Master studies.

Selection and training of new lecturers of study courses is performed based on Ph.D. studies. Ph.D. students of the first study years are involved in development of seminar topics, methodological

materials, while Ph.D. students of further study years work as assistants to the leading professor of a study course or lead a relevant study course in some cases if their knowledge and skill level is appropriate for this. The results of the research carried out during Ph.D. studies are integrated in Master and Bachelor study programs and their study courses in the relevant science fields, thus ensuring the integrity of knowledge transfer and research on all study levels. Ph.D. students, in cooperation with a scientific supervisor, supervise graduation papers of Bachelor students and parts of the graduation papers of Master level within their relevant research area.

Ph.D. students transfer their research experience to students of lower levels, encourage and inspire them for undertaking research and studying on an advanced level, thus ensuring maintenance and sustainability of research directions contributing to the researchers' generation cycle in the materials science field.

IDT implements 6 research directions:

- Modification of natural and chemical fibre, materials and products and optimisation of their properties for improvement of the user's comfort and safety.
- Research of smart textiles, clothing, sewn products and relevant electronic systems and development of innovative solutions; development and innovative environmentally friendly products and technologies.
- Research of wood and wood-based materials and structures, development of innovative solutions; development of the knowledge base of wood processing tools and machinery, historical constructions and terminology.
- Design of sustainable products with a high added value of wood and other Latvian renewable resources and their processing waste, development and optimisation of manufacturing technologies.
- Development of coatings containing modifications of fibre textiles and solid surfaces (synthetic polymers of a wood plate), bioactive and other functional substances and nano-webs.
- Research of comfort in clothing; research of evaluation of the fit of clothing; research of functional textiles, clothing and protection means and improvement of design thereof; integration of 3D anthropometric data in CAD environments.

Development and defence of Ph.D. thesis, as well as content development, supplementation and updating of specialised courses of the Ph.D. study program is performed within the above research directions (see more details in Section 2.5).

The fact that the graduates of IDT Ph.D. study program have been granted the ESF funding for implementation of post-doctoral (PostDoc) projects confirms that the topics of Ph.D. thesis developed within the study program are topical and research should be continued.

- Dr.sc.ing. Edgars Kirilovs, within a period of 36 months (16.10.2017 - 15.10.2020), implemented the project “Structures and technology development of smart insulation materials for indoor microclimate regulation”.

- Dr.sc.ing. Zane Zelča, within a period of 30 months (01.01.2021 - 30.06.2023), is implementing the project "Antibacterial and Antiviral Nano and Micro Fibrous Materials for Bioprotective Applications”.

2.3. Assessment of the study implementation methods (including the evaluation methods) by providing the analysis of how the study implementation methods (including the evaluation methods) used in the study courses/ modules are selected, what they are, and

how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

The study program and the study courses comprised by it are student-focused because the different student audience, their background knowledge, skills and experience, the variety of needs of Ph.D. students is taken into account and respected, thus adjusting the individual learning path for each of them. Various forms of implementation of the content of study courses are envisaged for implementation of the study program. The academic staff works with students in small groups, however, most of the work is performed individually. The study process is organised in such a way as to encourage a Ph.D. student to be independent, at the same time providing guidance and support by the academic staff as a scientific supervisor and a mentor. The Ph.D. study program is implemented within close cooperation between a Ph.D. student and the scientific supervisor of the Ph.D. thesis, as this mechanism allows achieving the study result. ***Upon admission to Ph.D. studies***, a student prepares the Ph.D. student's ***work plan*** for the first study year and the plan (schedule) of development of the Ph.D. thesis research for the whole Ph.D. studies period approved by the scientific supervisor of the Ph.D. thesis and submits it to RTU Ph.D. Studies Department. The plan comprises sections, like the title of the research work, substantiation, topicality of the theme, as well as the scientific novelty and practical application. It provides the study courses to be completed, the stages of the science work, preparation of publications, participation in conferences, as well as the teaching work and improvement of qualification (seminars, conferences, symposiums, internship). A Ph.D. student agrees on the plan for every next study year with the scientific superviros and submits it to RTU Ph.D. Studies Department, moreover, the work plan may be amended or supplemented latest two week before the start of the relevant semester. A Ph.D. student may change the scientific supervisor, as well as to involve a co-supervisor and a consultant by submitting a substantiated application during studies.

Thus, already at this implementation stage the principles of student-focused education are complied with: timely preparation of the plan encourages the student's independence, at the same time providing support by the scientific supervisor and academic staff; mutual respect in relations between students and academic staff is promoted by following the principle of democracy and taking into account of a student's opinion by the administration.

The form of the studies includes lectures, practical and laboratory assignments, seminars, study papers and teaching internship. Active teaching methods are extensively used at classes, like group work on issues, discussions, presentation of reports on the results of the science work, etc. *Students' independent studies play an important role*. The description of this process is included in the description of the study course as a mandatory component. Students' ability to study independently is developed at all study courses and within the framework of the science work.

The study program provides for ***comprehensive implementation of the study results***. Upon starting a study course, the academic staff presents the study results to be attained in the course and they are also presented in the description of the study course. The set of relevant knowledge, skills and competence and the assessment system and criteria are also defined there. The link between the attainable results of the study program and study courses is ensured. The content of study courses and their volume in credit points is developed according to this. The mutual link and sequence of study courses within the framework of acquiring the study content is assessed minimum once a year. Descriptions of all the study courses of the study program are collected in RTU Register of Study Courses. RTU portal ORTUS environment (Moodle) is actively used where

professors post, and students use teaching materials in a digital form outside study rooms. An extensive range of literature sources is available remotely in international scientific online data bases of RTU Science Library: Web of Science, Scopus, Ebray, ProQuest, etc. In the beginning of each semester, the calendar schedule of a study course and the system of examination and assessment of knowledge is posted in ORTUS environment, thus students receive additional information regarding the expected results of the study course. This improves efficiency of the study work considerably.

In order to provide an opportunity to complete the part of the study program related to skills and practice of scientific research works, Ph.D. students of the study program are involved in various research projects, including in performance of the grants of the Latvian Council of Science of and RTU, performance of scientific research projects assigned by the ministries of the Republic of Latvia, performance of research projects with foreign funding, including the EU funding. Ph.D. students jointly with scientific supervisors participate in international science conferences.

Assessment of study results is done in compliance with Senate of RTU decision of 29 May 2017 (Minutes No. 610) "Regulation on the Assessment of Learning Outcomes", which conforms to the core principles and procedure of assessment of education on the relevant education level defined by the Cabinet Regulations of the Republic of Latvia. The ***cumulative assessment approach is applied in assessing*** students' achievement where the final grade consists of several components. The teaching methods for implementation of study courses, as well as the ***assessment methods*** are selected by the academic staff responsible for the study course in compliance with the specifics of the content of the study course and students' needs. The form of taking an exam is defined by the academic staff responsible for the study course and it is mandatory for all the academic staff of the particular study course. The head of IDT appoints a commission consisting of three persons, of whom at least one is a professor, and the others are Doctors of Science, for accepting exams and tests in mandatory and restricted elective specialisation courses. Students take exams in a written, verbal, computerised or combined form. All the results to be achieved in study courses are examined by applying appropriate methods. Besides an exam or a test, every study course also provides for assignments during a semester, in particular, reports, presentations at seminars, independent study tasks, etc. These assignments are defined by programs of study courses.

Assessment is consistent and fair; it is equally applicable to all students. Students may appeal against the assessments of study results; this is provided for by RTU Rules of assessment of study results. *Students receive feedback along with the assessment*, providing advice on the study process and the directions of improvement of research skills.

At the conclusion of each academic year, the Science Committees of faculties perform attestation of Ph.D. students. During the attestation process where all the Ph.D. students of the faculty participate, performance of the Ph.D. student's work plan is assessed by following the minimum requirements regarding preparation of publications and development of the Ph.D. thesis defined by RTU RTU Doctoral Regulations. Ph.D. students are transferred to the next study year by the decision of the Science Committee of the faculty.

The progress of Ph.D. students' work is additionally assessed in cases when it is required by the terms for successful participation in a project or the conditions of a financing instrument. For example, within the framework of the ESF project SAM "Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas" (8.2.2.0/18/A/017) Ph.D. students must submit reports at the end of each study semester (twice a year) by reporting on performance of the work plan and the progress of development of the Ph.D. thesis.

The principle of adding up positive achievements, the principle of mandatory examination, the

principle of transparency and clarity of assessment criteria; the principle of diversity of assessment forms and the principle of accessibility of examination is applied for assessment of Ph.D. students' study work within the study program. This assessment system has proven itself by achieving a higher level of knowledge and research skills, as well as better transparency and conformity of assessments to skills and knowledge.

The results of the assessment of Ph.D. students' knowledge and research performance are discussed at IDT council twice every academic year, they are summarised and assessed by the study program administration, and they serve as the basis for further improvement of the study process and study courses.

2.4. If the study programme entails a traineeship, provide the analysis and assessment of the relation between the tasks of the traineeship included in the study programme and the learning outcomes of the study programme. Specify how the higher education institution/ college supports the students within the study programme regarding the fulfilment of the tasks set for students during the traineeship.

The Ph.D. study program does not comprise internship, however, within the study program there is *the study course* "*Teaching Assistant Practice in Speciality"*. The study course is aimed tat developing the abilities needed by the new academic staff of the higher education institutions in the teaching work, for example, being familiar with the content and the teaching methodology of the study course selected for the test, practical teaching at classes for students, supervising, correcting, and assessing students' independent work, developing proposals of instruction. By completing this study course, Ph.D. students can successfully lead classes of the relevant study course by being familiar with its content and methodology and can assess the results of students' independent work accordingly. Passing of the study course depends on the achievement record of trained students. The results of the particular study course conform with the overall results of the study program when graduates are able to lead and implement the academic process by developing study courses, implementing and assessing the study content.

During the study course, practical teaching skills are mastered by involvement of Ph.D. students in implementation of Bachelor and Master level study programs. Involvement of Ph.D. students is in leading of laboratory and practical classes, preparation of lectures and delivering of lectures. Under supervision by experienced professors, Ph.D. students develop skills and ability in the academic work.

As in January 2021, there are 12 Scientific Assistants elected and employed at IDT, 50% of them are Ph.D. students who are involved in the teaching practice in leading study courses related to their research direction with the help of scientific supervisors IDT management. As described above, IDT has participated in ESF project No. 8.2.2.0/18/A/017 "Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas" and has thus increased its capacity to employ Ph.D. students with terminated contracts, allowing them to practice working at the university.

2.5. 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 evaluations of the final theses.

The final examination of the Ph.D. study program is defence of the Ph.D. thesis or a comparable set of scientific publications on the same topic at the Promotion Council.

IDT has defined six research directions listed above in Section 2.2 in the area of scientific activity and the work follows these directions. Their topicality in the relevant industries of the national economy and development of the materials science is confirmed by the implemented large and smaller scope projects and contract assignments. By submitting an applying for admission to Ph.D. studies, the topics of Ph.D. thesis are selected and approved according to the above referred six research directions of IDT. The below collection of topics of graduation papers indicate that in-depth research is focused on natural and chemical fibre materials, optimisation of their properties, various textile and clothing types, their technologies and traditional fibre materials, as well as smart and technical fibre materials, which are not restricted to only wood materials, but comprise also other ligno-cellulose fibre materials. The research directions also comprise design of user-focused fibre material products. The research directions follow from the directions of development of fibre materials and their products and the global demand thereof to a large extent. The topics of Ph.D. thesis defended during the report period and currently under development are summarised according to IDT research directions.

- An important part of Ph.D. thesis has been developed about modifications of natural and chemical fibre, materials and products ensuring optimisation of their properties and being particularly important for ensuring users' comfort and safety. Several theses are focused on development of new processing technologies of fibre grown in Latvia (lax, hemp, etc.), which will contribute to development of several industries of the national economy and export. Research has been dealing with solutions of production of innovative plate materials for both furniture production and construction.

Modification of natural and chemical fibre/ materials/ products and optimisation of their properties for improvement of the user's comfort and safety.

Subject	Defence year
"Efficient Use of Annually Renewable Raw Materials for Production of Fibre Boards and Composites"	2013
"Extension of the Range of Textile Modified at Nano-Level"	2014
"Technology Impact on Hemp Fiber Insulation Material Properties"	2014
"Raw Hide Preservation Using Vacuum Under Low Temperature"	2015
"Surface modification of yarns, cotton and mixed fibre textiles for improved performance"	under development
"Expansion of lignocellulose insulation board assortment and performance analysis"	under development

- The research of the second direction is focused on smart textiles, clothing, sewn products and relevant electronic systems, as well as development of innovative solutions, also adding development of innovative environmentally friendly products and technologies. These topics

coincide with the current effort of the textile and clothing industry to create modern use and environment friendly, functional textile products by introducing smart solutions (integration of electronic systems in closing, control of the microclimate, etc.). Development of Ph.D. thesis has resulted in the Latvian terminology of the industry being sorted out and further development.

Research of smart textiles, clothing, sewn products and relevant electronic systems and development of innovative solutions; development and innovative environmentally friendly products and technologies

Subject	Defence year
"Development of Electronic Thermoregulatory System Integrated into Clothing"	2014
"Improvement of Smart Textile Products Design"	2014
"Integration of Human Motion Energy Converter into Clothing"	2019
"Humidity sensor integrated in textiles"	under development
"Development of textile sensors"	under development

- The third research direction is focused on topics related to nano-level modifications of fibre, textiles, and solid surfaces, for example, development of coatings containing bioactive and other functional substances and nano webs, optimisation of their production technologies and development of testing methods thereof. These topics are important in the materials science field, considering the current progress of nano technologies and the increasing possibilities to use them for modification of various materials by giving new properties and new, improved functionality or usability to them.

Development of coatings containing modifications of fibre textiles and solid surfaces (synthetic polymers of a wood plate), bioactive and other functional substances and nano-webs

Subject	Defence year
"Technologies, Structure and Properties of Lignocellulosic Nanofibre Bicomponent Filaments"	2015
"Extension of Assortment of Hemp-Based Composite and Technology Optimization"	2019
"Development of PLA composites reinforced with hemp fibre"	under development
"Testing methodology of the strength of nano-level coatings of textile materials"	under development

- Research on comfort in clothing has become increasingly important in the textile and clothing

field for solving the issues of product sustainability. The topics of Ph.D. thesis developed within this direction include assessment of the garment fit, research on improvement of the design of functional textiles, clothing and means of protection, as well as integration of modern 3D anthropometric data in computer aided design system (CAD) environments. Comfort in clothing has always been a complicated concept and the topics of Ph.D. thesis indicate various attempts to both define and solve this issue, for instance, by applying modern technologies or performing cross-sectoral research. The research includes improvement of clothing design methods by applying the state-of-art technologies, as well as improvement of the quality of special purpose clothing. Based on the results of the Ph.D. thesis of Dr.sc.ing. I. Šivtjenkins, clothing sets for soldiers were designed for the Latvian Army and purchased, and their performance was evaluated.

Research of comfort in clothing; research of evaluation of the fit of clothing; research of functional textiles, clothing and protection means and improvement of design thereof; integration of 3D anthropometric data in CAD environments

Subject	Defence year
"Enhancement of the Combat Individual Protection System"	2014
"Improvement of the methods of assessment of the anthropometric fit and ergonomics of clothing"	under development
"Evaluation of clothing fit"	under development
"Psycho-physical comfort in clothing"	under development
"Designing of Functional Clothing"	under development

- Also Ph.D. thesis on topics within the research direction of research of wood and wood base materials and structures, use of ecological materials and technologies in wood processing and furniture production and development of innovative solutions are being developed. The direction also provides for research on recording wood processing tools, machinery, historical wood construction, ancient craftsman work methods and development of the terminology knowledge base.

Research of wood and wood-based materials and structures, development of innovative solutions; development of the knowledge base of wood processing tools and machinery, historical constructions and terminology

Subject	Defence year
"Systematisation and structuring of the data base of wood processing manual tools"	under development
"Unified connections for wooden frame buildings"	under development

- As the issue of preservation of the environment takes the lead, the need for sustainable

products with a high added value will increase continuously. Within the sixth research direction, the topics of design of products made of wood and other Latvian renewable resources and their processing waste, development and optimisation of manufacturing technologies are elaborated. Research provides for studying the properties of fibre materials, development of products and technology prototypes and their integration in products of technical application. Recycling of clothing, textiles and other materials is a topical issue on the global scale, and extensive, high quality research is needed for solving it, therefore these topics should be viewed as important and topical.

Design of sustainable products with a high added value of wood and other Latvian renewable resources and their processing waste, development and optimisation of manufacturing technologies	
Subject	Defence year
"No-waste opportunities in sustainable fashion design"	under development
"Renewable resources in non-woven materials, for use in light car structures"	under development

Ph.D. thesis and their topics have received high appreciation.

During the report period, IDT Ph.D. students have received awards - in 2014 Z. Zelča received Werner von Siemens Excellence Award In 2015, S. Vihodceva was awarded the Latvian Academy of Science Young Scientist Award for the Ph.D. thesis “Extension of the Range of textile Modified at Nano-level”. As stated above in Section 2.2, two topics of Ph.D. thesis: E. Kirilovs "Efficient Use of Annually Renewable Raw Materials for Production of Fibre Boards and Composites", and Z. Zelča "Extension of Assortment of Hemp-Based Composite and Technology Optimization", were recognised as important and granted the ESF funding for PostDoc project development.

2.6. Analysis and assessment of the outcomes of the surveys conducted among the students, graduates, and employers, and the use of these outcomes for the improvement of the content and quality of studies by providing the respective examples.

The results of surveys of students, employers and graduates are used for improving the quality of the study program. Electronic surveys of students in ORTUS environment are performed every year in compliance with RTU study quality monitoring and provision system. However, it has been observed that the overall activity of respondents in filling in surveys is low.

The survey is performed to assess the progress of the acquisition of the Ph.D. study program and development of the Ph.D. thesis according to the schedule, the development of publications and participation in conferences by Ph.D. students, as well as satisfaction with organisation of the Ph.D. studies and the work of the scientific advisor of the Ph.D. thesis. Graphic analysis of survey results is summarised in Annexes *Alumni survey results* and *Survey of Students*.

Ph.D. students give varied evaluation of their **progress of acquisition of the study program and development of the Ph.D. thesis,** almost a half of them complete what has been scheduled and almost two thirds are satisfied with this progress. Ph.D. students referred to the lack of time due to family circumstances and employment as the main obstacles hindering attainment of the

planned results. This result is not surprising taking into account that most Ph.D. students have full time employment. One third of respondents mention the lack of financial support for publication of scientific articles and participation in conferences and one third refers to the lack of motivation as an obstacle for achieving the planned progress.

According to the replies of Ph.D. students regarding stages of development of their Ph.D. thesis, it should be concluded that more than two thirds are actively progressing in their work at the end of the first study year. Activity decreases during the second study year. At the end of the third year, one third of students has prepared 40% of the Ph.D. thesis. At the end of the third year, one third has completed 60%, one third is close to completion at 80% readiness.

The analysis of the **publication activity** indicates that it is highest in the third and fourth study year. The number of published articles in the second study year has also increased during recent years. The frequency of attendance of conferences also increases at the completion of studies. Up to three conferences are attended during studies on average, in some cases the number is higher. For the purpose of developing the capabilities of preparing publications, it is recommended to Ph.D. students to complete RTU study course "Writing scientific papers for international journals".

The survey reveals that a part of Ph.D. students is seriously involved in **teaching activity.** To reduce the load of this work, the study course "Teaching Assistant Practice in Speciality" was transferred from the first study year to the second study year when Ph.D. students have already completed the compulsory study courses of the study program.

The survey results regarding the **Ph.D. students' satisfaction with the scientific advisor of the science work** indicate that the respondents are mostly satisfied with cooperation with their scientific advisor and the provided support. In particular this refers to the ability of the scientific advisor to provide advice on solution of theoretical or methodological issues, the supervisor's support in preparing scientific articles, provision of information regarding opportunities to participate in conferences and to receive financing for publication of scientific articles or participation in conferences, accessibility of the scientific advisor.

The analysis of the graduates' survey regarding ***organisation of the Ph.D. studies*** leads to the conclusion that almost all the graduates have appreciated cooperation with RTU Ph.D. Studies Department, the faculty secretariat, and their scientific advisor of the Ph.D. thesis. Availability of information about the study process is also satisfactory. The survey results indicated that the distribution of the study load should be modified, which has been done by modifying the schedules of study semesters.

The availability of technical equipment also received average evaluation - the mean score was 2.8 points or close to partial satisfaction. In order to provide more extensive availability of laboratory equipment, the study course "Methodology of Research" was supplemented by a section of the study course where it is possible to master modern research equipment and methods. It will be implemented at FMSAC Institute of General Chemical Engineering where the broadest range of modern equipment necessary for materials research in RTU is available. There are also problems regarding availability of sector publications where there is access for a charge in most cases of the most recent publications. In order to provide access to sector standard documents, the subscription to the data base of the national standards of Latvia is provided in the IDT premises.

The graduates' evaluation was very different regarding conformity of the study plan to the knowledge necessary in the industry, i.e., 50% evaluated it as unsatisfactory and the other 50% considered it as satisfactory or very satisfactory. Therefore, the updating of study courses described in Section 1.1 was performed in the study program and new study courses were added to the study program.

Employment of graduates is among the most important indices. There is demand for the graduates of the study program. Their teaching, scientific and organisational work is appreciated by unit heads at RTU, as well as department heads at the Ministry of Education.

2.7. Provide the assessment of the options of the incoming and outgoing mobility of the students, the dynamics of the number of the used opportunities, and the recognition of the study courses acquired during the mobility.

The study process and its efficiency are considerably affected by the possibility provided to students to supplement their knowledge at foreign higher education institutions. Participation in mobility programs allows students expanding the scope of their knowledge and competence, improving their communication ability with foreign students, supplementing their knowledge of foreign languages. Students have opportunities to study, perform research or have internship in foreign higher education institutes and science institutes within ERASMUS program. RTU offers several opportunities for implementing mobility https://www.rtu.lv/en/internationalization/mobility.

Ph.D. students use mobility opportunities both by individually planning events of experience exchange and by participating in measures organised by cooperation partners. Ph.D. students are also involved in implementation of various research projects, including international projects providing for business trips and work abroad. Mobility and internships have resulted in preparation of publications and parts of Ph.D. thesis as described in Section 3.2.

3 mobility measures of Ph.D. students took place in study year 2013/2014, two of them were internships at higher education institutions in Poland and Germany, and one was within the framework of ERASMUS program in Kaunas University of Technology (hereinafter referred to as KTU), in Lithuania.

In study year 2018/2019 two Ph.D. students used mobility visits, one of them had internship in Finland at Ikaalinen Design and Crafts College (IKATA) and one participated in training in Lithuania (KTU).

Students visit domestic and international undertakings operating in the industry and trade fairs, as well as participate in events of various scales (workshops, seminars, summer schools, etc.), for example:

- in 2016 participation in the workshop of new researchers “Fibre Quality Workshop for Young Researchers” at Université de Lille in France – the Ph.D. student U. Iļjina presented a report there;

- in 2017.two students led the RTU IDT wood processing workshop as mentors and participated in the hackathone at the Wood processing and furniture production centre in Estonia and also participated in the International Conference "Masters build future - new forms of entrepreneur training and business transfer to the young generation" in Latvia;

- in 2018 one Ph.D. student visited international trade fairs in Poznan, Poland, and in Tampere, Finland, and two students used 4 opportunities: participation at the international furniture and wood design workshop in Valmiera; visit to the Scandinavian design fair “Stockholm Furniture & Light Fair” in Sweden; participation in the Design think-tanks of the Decorative Art and Design Museum for teachers; as well as attendance of networking seminars organised by the Latvian Investment and Development Agency;

- in 2019 two Ph.D. students visited the Wood processing and furniture production competence

centre TSENTER in Estonia.

- Ph.D. students have also used the possibilities of internship in the industry undertakings, for example, in 2019 one student had internship in the Latvian company “Silvanols” and two students had internship in the undertaking JSC BRASA.

Map with Mobility Destinations

The summary with examples, besides Latvia, presents the 7 countries (see the map) where totally 10 Ph.D. students of IDT have used mobility opportunities and attended various events. The most popular destination during this period has been Estonia (16%), followed by Lithuania, Poland, Finland, and Sweden (8% each) and France and Germany was visited by one student each, 44% of the activities have taken place on the Latvian scale.

Simultaneously with the above-described mobility activities, Ph.D. students also attend and participate at domestic and international conferences by presenting their research developed during working on their Ph.D. thesis and within the framework of various cooperations, for example, scientific projects.

According to the objective assessment, Ph.D. students insufficiently use mobility opportunities, and additional planning is needed for more active involvement of Ph.D. students in the mobility to ensure transfer and integration of international experience and research practice in the research process.

Within the framework of incoming mobility, 8 Ph.D. students visited IDT over the period from 2014 to 2017 for various periods.

In September 2017, the Ph.D. student of KTU had internship at RTU FMSAC IDT Anthropometric laboratory and, in cooperation with I. Dāboliņa, the head of the laboratory, and the Ph.D. student E. Lapkovska performed experimental 3D scanning and analysis, which has resulted in a joint scientific publication.

In 2017, by using a scholarship from the government of Lithuania, the KTU Ph.D. student had internship at IDT.

In the spring semester of 2015, supervised by IDT prof. I. Baltiņa, the study course "Textile material Research" was completed and the exam was successfully passed by two KTU Ph.D. students. In 2015 a KTU Ph.D. student, supported by a grant of the Ministry of Education and Science of

Lithuania and Latvia, had internship performing research on ethnographic textiles.

In 2014, at the IDT Textile materials research laboratory, supervised by I. Baltiņa, the KTU Ph.D. one student , and two KTU Ph.D. students in the Material sciences laboratory, supervised by S. Kukle, studies nano-spinning technologies.

Within the framework of COST program, from 1 December 2015 to 31 January 2016, in the Material sciences laboratory, supervised by S. Kukle, a Ph.D. student from Genova University (Italy) has internship and performed research on the topic “Characterisation and optical properties of polycarbonate transparent wire from a mixture of solvents with cerium nanoparticles”.

III - DESCRIPTION OF THE STUDY PROGRAMME (3. Resources and Provision of the Study Programme)

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. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

Basic information about these matters is provided under the criteria of Paragraphs 3.1-3.3 of Section II of the report on the study direction. This paragraph additionally focuses on the information related to the Ph.D. study program.

RTU has a decentralised budget, therefore, each structural unit has a separate own budget. In RTU, revenue and expense are managed according to the principles approved by the Senate or defined by the Vice-Rector for Finance according to his delegated authority. Revenue can be split in the part assigned to the structural unit in the result of calculations, based on the volume of work and/ or the indices of the preceding periods. At RTU every head of a structural unit has remote access to operational financial information on the budget of the structural unit, including the scheduled workload and allocated funding in future periods for implementation of study programs and study courses. In the beginning of every fiscal or budget year, the head of a structural unit plans the works of the structural unit, including wages for the academic staff subordinated to the relevant head, and develops a procurement plan for the next year for providing implementation of the study program or courses.

The state budget funding is utilised for implementation of the study program. See below information regarding the financial resources of the Ph.D. study program.

Table 3.1

Financing of the Ph.D. study program according to RTU data

Study year	State budget funding for the program, EUR	Costs per student, EUR

2013/2014	86291.00	11598.00
2014/2015	70663.00	11598.00
2015/2016	92394.93	11598.00
2016/2017	81264.32	11598.00
2017/2018	83689.55	12121.97
2018/2019	87196.61	12689.04
2019/2020	115121.88	13215.13

Resources available for implementation of the study program are sufficient for ensuring achievement of the results defined by the study program. Additional financing for renovation of laboratory equipment will be required during the next years.

Information and data base providing the study process for Ph.D. students, as well as for the academic staff and employees is mainly available in the electronic study environment ORTUS. The portal provides the e-study environment, a career section, a virtual system of the plans of classes and examination period, the scientific activity support system, information to employees, the data base of laws and regulations and the project management system. By using ORTUS, students and academic staff have access to extensive information resources, including electronic library resources which are continuously updated. Within RTU ORTUS environment, students have access to international data bases: Web of Science, EBSCO, SCOPUS, Science Direct, SpringerLink journals and books with full text, other information resources. Specialised necessary literature sources are provided by the relevant profile structural unit which procures annual subscriptions within the unified procurement of the RTU library. Access to the data base “Latvian standard” is available for IDT via the RTU library as from 2020.

For Ph.D. students there is *a work desk in IDT premises and free access to science resources*.

As from 2013, the Ph.D. study program is implemented in the new building of IDT at Ķīpsalas Street 6, where there are premises for IDT, the Faculty of Architecture and RTU Design Factory. Environment compliant with modern requirements is provided there. All the rooms intended for the study process are equipped with multimedia hardware, i.e., a computer with the Internet connection, a system of speakers and an overhead projector. Thus, it is possible to provide a modern study process. In the building of IDT at Ķīpsalas Street 6, 12 laboratories, 6 workshops and classrooms are used for the needs of the study program.

The major infrastructure sites available to IDT Ph.D. students are as follows:

Two measurement laboratories (16.7m^2; 38.4m^2 ;21.6 m^2) – one of them is suitable for ***performing various research and measurements related to nano-coatings and production of nano-fibre from polymeric liq*uids**. It is equipped with a magnetron sputtering device for applying metal and semi-conductor nano-layers onto various surfaces; an electrical spinning device for production of nano-fibre from polymeric liquids; as well as a thermal cabinet for large samples. The other laboratory is intended for performance of various practical research, testing of materials (textiles, wood materials, etc.) and identification of their properties**.** It is equipped with Bruker AFM atomic force microscope; Permatest SENSORA device for determining the heat resistance and vapour permeability of cloth; Fungilab viskoziometre; Motic microscope

with a camera and 100x possible magnification; magnetic and mechanical mixers; Rhopoint device for determining the surface gloss. Required climate conditions can be provided and adjusted in the laboratory.

Anthropometric laboratory (51.8 m^2)**,** equipped with a human body 3D scanning device Vitus Smart XXL® (Human Solutions Group GmbH) with the data processing system AnthroScan for studying measurements and build peculiarities of a human body, which is used for improvement of clothing and other products and analysis of their interaction with the human body - fit and ergonomics. Computerised design CAD/CAM system Assyst with the virtual 3D prototyping module Vidya is used for experimental designing of various assortment of clothing and analysis for completing various research processes and graduation projects. Within the framework of research and cooperation projects, scanning of individuals, groups of people and various items, data processing, preparation of images and files of various formats is performed.

Textile materials research laboratory (59.1 m^2 and 77.1 m^2) - enables testing and research of the most common physical properties of cloth. The equipment is used both in the study process and scientific research. Ph.D. students have access to varied equipment - vapour resistance and heat resistance testing chamber, Martindale abrasion and piling trend tester, air permeability tester, cloth non-creasing testers for directed and undirected creasing, cloth robustness tester, colour resistance tester under dry and wet friction, cloth draping tester, cloth surface wetting tester, universal tester for determining mechanical properties, colour resistance tester under the artificial lighting and humidity, a climate chamber, dryer, washing machine, scales.

Clothing and textile products design CAD/CAM laboratory (53.5 m^2). Specialised computer aided design and simulation systems are available for textile design and technical calculations, preparation of clothing details, design, template production, layout calculations, production of the cut-out assignment and placement of templates: Grafis CAD Software, Lectra, Assyst, Comtense, Pe-design, Koppermann, Tex-Design. There are also 16 computer desks, the plotter Canon iP770 for printing out drawings and details.

Simulation and design laboratory (79.7 m^2) with 21 computer desks. Various computer aided design and simulation systems are available for students, providing high quality and modern study process- the general application 2D and 3D design, calculation and image processing systems and application software: SketchUp, ArchiCad, SolidWork, Autodesk 3DS Max, AutoCad, Adobe Photoshop, Adobe Illustrator, Adobe Indesign, Adobe Dreamweaver, Comsol Multiphysics, Revit, MatLab, MS Office + MS Visio.

Sewing machines mechanics and embroidery laboratory (46.8 m^2) – a laboratory for studying sewing equipment and their processes, equipped with laboratory models of sewing machines - a single needle straight closing jab, two needle straight closing jab, single needle hidden loop jab, two needle flat loop jab, single needle edge processing loop jab, two needle stitching and overhand stitching loop jab, figural button hole processing equipment, embroidery machines - Brother PR600II and Innovis 750E; embroidery computer software PE Design 8. and the straight knife cutting device. Research on smart textile product design by integration of electronic elements in cloth by applying the embroidery is performed at the laboratory.

Knitwear and textile laboratory (73.6 m^2) - intended to be used for the study process and research work. Equipment can be used to produce fibre material non-woven or composite materials samples; a roll for weaving, to weave both traditional and smart cloth. Samples for study and graduation projects and research can be produced in the laboratory. Equipment: automated micro-shuttle loom, cutting machine with a mirror frame, laboratory combing device, reeling device.

Wooden materials research laboratory (29.4 m^2**)** with equipment for determination of humidity,

weight, density of wood, wood base and various plate and sheet loose materials, granulometric analysis of loose materials, determination of mechanical properties of various materials.

In the institute, Ph.D. students have an opportunity to work in several ***experimental development workshops and laboratories*** equipped with relevant devices - the Wood Technology and Mounting Workshop (375.4m^2); Sewing workshop (88.9 m^2); Fashion Design Master Workshop (156.8 m^2); Tie-dyeing Workshop (11 m^2); Weaving Workshop (54.4 m^2); Knitwear Workshop (59.4 m2); Materials, Technologies and Design Laboratory (57.8 m^2); Wood Processing Laboratory with Manual Tools (39.7 m^2 and 16 m^2); Layout Design and Wood Processing Laboratory (17.9 m^2).

IDT employs two people as technical personnel for ensuring functioning of the laboratories and equipment, i.e., an IT administrator and a technician.

Besides the FMSAC IDT Department of Design and Materials Technologies and Department of Clothing and Textile Technologies, also the Institute of General Chemical Engineering and the Department of Polymer Materials Technology is involved in the implementation of the study process and provides parts of the study courses "Methodology of Research" and "Fibre Materials Science". In the laboratories there is a scanning electron microscope with energy dispersive X-ray spectroscopy detector, X-ray diffractometer, Fourier transformation infrared spectroscope, picnometers, BET surface area analysis equipment and other devices.

RTU administers the research equipment and service portal UseScience for research institutions, students, businesses and other stakeholders, partner institutions and industrial undertakings in Latvia and abroad. The portal provides an opportunity to contact the person responsible for certain equipment and to agree on the use of the service or equipment.

RTU Office of Vice-Rector for Research administers the ***Science Support Foundation*** which provides support for research activity, provides maintenance and accessibility of research infrastructure, as well as provides financial support to Ph.D. students for publication of their scientific articles submitted for publications of cited data bases, as well as participation in conferences.

RTU Ph.D. studies grants are also available, and they cover the costs of minimum 650 hours of work of a science assistant and/ or researcher and expenses for purchase of materials needed for research, use of equipment, publication expenses, participation at science conferences and costs of competence improvement. Ph.D. students of the study program regularly receive the financing of this grant. Financing is received from the European Social Fund project "Support for the implementation of doctoral studies at Riga Technical University".

For provision of support to Ph.D. students and new researchers, within the Ph.D. Study Department of RTU there is the ***Ph.D. Studies School***. Its main tasks include promotion of the professional growth of Ph.D. students, improvement of the quality of research work, development of inter-disciplinary and inter-institutional cooperation among new researchers, as well as involvement of students in science and continuation their education by starting Ph.D. studies. The Ph.D. Studies School organises various events (workshops, summer schools, discussions, etc.), advises and informs Ph.D. students regarding various support possibilities, evaluates the existing research environment and provides recommendations for its improvement, as well as cooperates with foreign partners for implementing its defined tasks. Ph.D. students actively use these opportunities.

3.2. Assessment of the study provision and scientific support, including the resources provided within the cooperation with other science institutes and institutions of higher

education (applicable to the doctoral study programmes).

Cooperation with leading foreign universities and research institutes (see cooperation partners in Annex 14 to Section II) allows provision of both a unique experimental base, and scientific and methodological expert examination, preparation of joint publications within the framework of cooperation. Several Ph.D. students have developed parts of their research work in universities and research institutes abroad and in Latvia.

Dr.sc.ing. E. Kirilovs, within the framework of ERASMUS program, by developing his Ph.D. thesis, performed a part of the experiments at ***Leibniz Institute for Agricultural Engineering and Bioeconomy*** (ATB) in Potsdam, Germany, by participating in hemp harvesting and cutting works, learning untraditional methods and technologies, as well as developing new structures of composite materials and testing them. The results and know-how attained within the research is further developed within the ESF project "Development of innovative technologies for maintaining and production of heat and cold“ (01.12.2013 - 31.08.2015). The cooperation with Potsdam research institute started within the development of the Ph.D. thesis was continued within the framework of Dr.sc.ing. E. Kirilovs' PostDoc project “Structures and technology development of smart insulation materials for indoor microclimate regulation“ (16.10.2017-15.10.2020) by further developing the research commenced within Ph.D. thesis and developing totally new insulation composite structures.

A Ph.D. student performed a part of experiments for Ph.D. thesis at the **School of Design, University of Leeds** (UK), which allowed the successful implementation of comparative experiments by developing hemp fibre based components as non-woven materials by applying technologies, like as needle punching, streaming and thermal welding, as well as carrying out necessary tests for evaluation of the set of properties of a large volume material. The results are presented in joint publications.

Another Ph.D. student worked on the development of hemp and flax non-woven materials at Leeds University, UK, within Erasmus+ internship during Master studies. In the continuation of the research, in cooperation with the ***Solid State Physics Institute of the University of Latvia (LU),*** the surface of the samples developed in UK were coated with metal and metal oxide particles to perform research on the possibilities to provide electrical conducting properties to cloth made of stem fibre. The obtained results are published in joint publications with cooperation partners from UK and the LU Solid State Physics Institute.

Part of the experiments of a Ph.D. thesis was performed at the ***Institute of Natural Fibres and Medicinal Plants INF&MP***, Poland. The extensive scope research performed at the institute is aimed at functionalisation of natural fibre and mixes for various applications, use of contaminated soil for growing technical cultures not intended for human consumption, processing of textile raw materials and waste as well as development of composite materials reinforced with natural fibre intended for application. The research of this Ph.D. thesis was continued at the ***Institute of Microbiology and Biotechnology of the Faculty of Biology of the University of Latvia*** where large scale experiments were carried out for assessment of anti-microbial properties of the samples.

Within the process of development of Ph.D. thesis, a part of experiments was performed at ***Kaunas University of Technology and Latvian State Institute of Wood Chemistry***.

Considering the limited research possibilities in the field of pre-processing of raw skin in Latvia, the Ph.D. thesis "**Raw Hide Preservation Using Vacuum Under Low Temperature**" was developed

at *Kaunas University of Technology* (Department of Physical and Inorganic Chemistry).

A Ph.D. student performed the practical part and a part of the research work of Ph.D. thesis within the framework of Erasmus internship at ***Niederrhein University of Applied Sciences***, Germany, where she produced woven, knitted, and coated cloth with the electromagnetic radiation screening properties. She acquired practical skills of application of knitting, automated weaving, and textile coating technologies. She also studied the screening properties of produced samples. The research of developed textiles was continued in cooperation with the RTU Technical Physics Institute and RTU Radioelectronics Institute.

A Ph.D. student developed the part of her Ph.D. related to development of the composition of non-woven composite material and production of samples at ***RWTH Aachen University***, Germany, which specialises in production of composites for use in the interior finish of cars. The Ph.D. thesis reviews the possibility of use of developed materials in the car industry.

III - DESCRIPTION OF THE STUDY PROGRAMME (4. Teaching Staff)

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

During the report period 2012-2021 there have been substantial changes in the academic staff of the study program and there are positive trends. The total increase is +42%. The academic staff of the study program consists of 18 members: - 3 professors, 6 associated professors, 5 leading researchers, 3 docents and 1 lecturer. During the report period 5 members of the academic staff (E. Kirilovs, I. Gudro, I. Kašurina, S. Vihodceva, Z. Zelča, G. Terļecka) have defended their Ph.D. thesis and received the Ph.D. degree allowing them to apply for the positions of the associated professor, leading researcher, and lecturer. This has resulted in a considerable reduction of the mean age of the academic staff of the study program. During the reporting period, two lecturers were promoted to the position of the associated professor. All the academic staff is Ph.D. holders. Three members of the academic staff retired and the associated professor I. Krieviņš passed away. Colleagues from the FMSAC Institute of Polymer Materials and Institute of General Chemical Engineering have joined the academic staff of the study program. Changes in the academic staff are presented in Figure 4.1.

As a result of the changes in the composition of the teaching staff, highly qualified pedagogues and outstanding material scientists have been attracted to the implementation of the doctoral study programme “Fiber Materials Science”. Thus professor J.Ločs - a full member of the Latvian Academy of Sciences has established and manages the Baltic Biomaterials Centre of Excellence, Professor R.Merijs-Meri is head of the Institute of Polymer Materials, Assoc. prof. I.Dāboliņa has created and manages Scientific Laboratory of Ergonomic Electrical Technologies and D.Beļakova - director of the Institute of Design Technologies, regularly manages and implements international and national scientific projects. The young materials scientist (Dr.sc.ing.). S.Vihodceva for her research work has received an award from the Latvian Council of science as a young scientist of the year and is currently implementing an ambitious post-doctoral project. The described changes in the composition of the teaching staff and their qualification together with the renewed study program structure and renewed study courses open new broad perspectives for doctoral students in the

study process, to acquire a much wider range of research equipment, to use it in the study process and in their scientific research in the field of fiber materials and their product design.

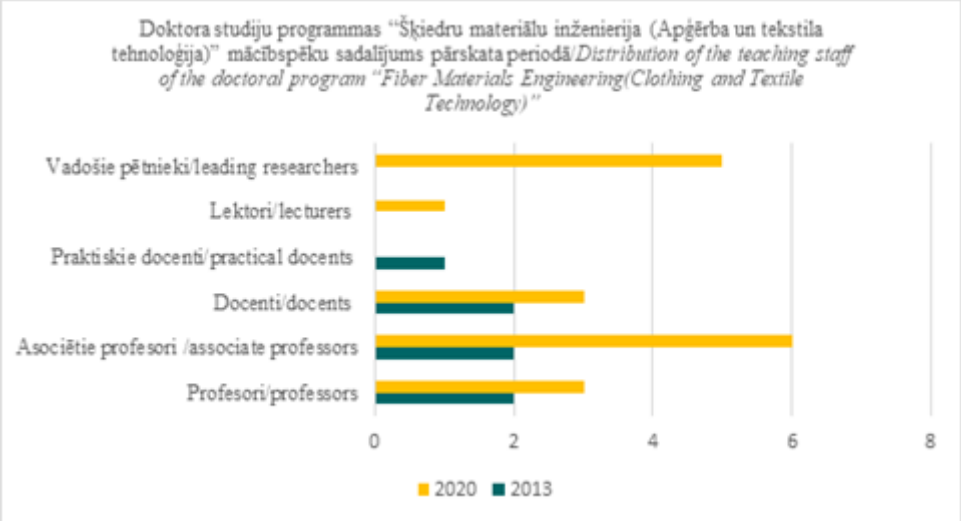


Figure 4.1 Split of the academic staff of the Ph.D. study program during the report period 2013-2021.

Also, the age structure of the academic staff has changed. The mean age has decreased in almost all the groups of lecturers, which indicates the change of generations of the academic staff and renewal. The overall mean age has decreased by 17 years, 8 of the lecturers belong to the age group below 40 years.

Table 4.1

Changes in the composition of the academic staff and the mean age in the Ph.D. study program

	2013/2014		2019/2020	
Academic staff	Number	Mean age, years	Mean age, years	Number
Professors	2	65	53	3
Acting professors	1	72	-	0
Associated professors	2	54	51	6
Lecturers	2	46	42	3
Practical lecturers	1	72	-	0
Assistants	0	-	36	1
Leading researchers	0	-	41	5
Total:	8	62	45	18

4.2. 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.

Totally 18 highly qualified academic staff members from the institutes, departments and laboratories of RTU FMSAC are involved in the implementation of the Ph.D. study program “Fibre Materials Science" (until 2021 “Clothing and Textile Technology”): IDT Department of Clothing and Textile Technologies and Department of Design and Materials Technologies; Department of Polymer Materials of the Institute of Polymer Materials; the Institute of General Chemical Engineering and the Research Laboratory of Functional Materials Technologies.

The overall composition of the academic personnel is presented in the information provided under criteria 3.5-3.6 in Chapter 3 of Section II and in the CVs of the academic staff attached in Annex 6 to Section II. This paragraph will be focused on describing the competence of the personnel involved in the study program in the delivery of the particular study courses.

The study program is implemented by 18 academic staff members from IDT and 2 members from FMSAC. Nine members of the academic staff involved in the study program have the authority of an expert in the field of engineering science and technologies of the Science Council of Latvia (hereinafter - LSC). LSC experts in material sciences are I. Baltiņa, D. Beļakova, U. Briedis, I. Dāboliņa, E. Kirilovs, S. Kukle, Z. Zelča, J. Ločs and R. Merijs-Meri. R. Merijs-Meri also holds the LSC expert's authority in chemical engineering science and J. Ločs - in the chemical engineering science and the chemistry field.

The qualification of the academic staff involved in the implementation of the study program conforms with the conditions of implementation of the study program and the requirements of laws and regulations, in particular, all the academic staff hold the Ph.D. degree, and all the scientific supervisors of the Ph.D. thesis are authorised LSC experts.

Scientists involved in the implementation of the study program specialise in various fields of the materials science: research of types of traditional, technical, and smart fibre materials and their technologies, as well as construction and design of user-focused products. Some members of the academic staff have additional specialisation in the chemical engineering science.

Academic staff involved in delivering study courses:

“Research Methodology” - S.Kukle, J.Ločs; ***“Fibre Materials Science”***- S.Kukle, I.Baltiņa, R.Merijs-Meri; ***“Design Thinking in Engineering Sciences”***- S.Vihodceva, D.Beļakova**; *“Special Course of the Research Direction” (textile)*** - D. Beļakova, I. Baltiņa, I. Ziemele, U. Briedis, A. Okss, G.Terļecka, I. Kašurina, I.Dāboliņa, A. Vališevskis; ***“Clothing Comfort”*** - I. Ziemele, D.Beļakova, G. Terļecka; ***“Functional and Smart Clothing Development and Research”*** - I. Ziemele, U.Briedis, A. Vališevskis, I. Kašurina, D.Beļakova; ***“Advanced Textile Technologies”***- I. Baltiņa; ***“Development and Research of Smart Textiles”***- I. Baltiņa; ***“Textile Material Research”***- I. Baltiņa; ***“Progressive weaving technology”*** - I. Baltiņa; ***“Research in Knitting Processes”***- A. Okss, I. Baltiņa; ***“Research of Fabrics Modified by Multi-Systems Yarns”***- I. Baltiņa; ***“Research in Clothing Assortment and Quality”*** - I. Ziemele, D. Beļakova; ***“Research in Clothing Technology”***- I. Ziemele, U. Briedis; ***“Methodology of Clothing Design”***- D. Beļakova, I. Dāboliņa; ***“Experimental Research in Sewing Equipment Quality”***- U. Briedis, I. Ziemele; ***“Specialized Bio- and Nanotechnologies”*** - S. Kukle, R. Merijs-Meri; ***“Wood Processing Technologies and Creative Design “***- E. Kirilovs, S. Kukle, Z. Zelča; ***“Conceptual Models of Fibre Materials and Product Design”***- Z. Zelča, E. Kirilovs; ***“Special Course on Research Direction”***- E. Kirilovs, S. Kukle, A.Ulme, I. Gudro, Z. Zelča, J. Dāboliņš; ***“Theorethical Aspects of Design”*** - A. Ulme, S. Kukle; ***“Teaching Assistant Practice in Speciality”***- A. Ulme, I. Ziemele; ***“Research Work”*** - D. Beļakova, S. Kukle, I. Baltiņa.

Selection of the academic staff is based on their scientific activity experience and also considering the specifics of the study program and study courses. The below brief biographies of the academic

staff present the qualification of the academic staff, experience in planning, supervising, and performing research projects (alphabetic order).

Ilze Baltiņa, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT professor and leading researcher at the Department of Clothing and Textile Technologies. Academic and scientific work in the higher education institution has been performed since 1989, specializing in clothing and textile technology. Work experience is based on more than 70 scientific publications. The rights of an expert of the Latvian Science Council in the sub-branch of textile and clothing technologies in the field of material science. The conducted courses are related to three areas of specialization, such as textile production technologies and new product development, textile research, quality properties evaluation and smart textiles. Regular supervision of final theses in master's and bachelor's professional studies. Under the supervision of I. Baltiņa, a doctoral thesis in materials science has been developed and defended. The knowledge and experience gained in projects and scientific work are integrated in the teaching process. As a leading researcher, she participates in both international (Erasmus +, INTERREG EUROPE) and national research and education projects. She is the Deputy Chairwoman of the RTU Trade Union and the Chairwoman of the IDT Trade union office. Member of the Latvian Council of Experts in the Textile, Clothing, Leather and Leather Products Industries. Member of the scientific editorial board of the 19th International World Scientific Textile Conference Autex 2019, as well as a reviewer of several scientific journals and collections of articles (Cellulose, Journal of Industrial Textiles, Journal of Textiles and Light Industrial Science and Technology). Participated in the preparation of two RTU patents. Participated in the exchange of experience of Erasmus academic staff. Regularly participates in professional development and training seminars.

Dana Beļakova, Dr. sc. ing., associate professor. Professional work experience since 1992. Her work at the university began more than 18 years ago, performing pedagogical, scientific and administrative work in 2003. The conducted courses can be divided into three areas of professional competence and are related to clothing design and production (including clothing design and technology, work performance rating in clothing production companies), design and technology project management and solving sustainability issues. Competence in design and technology project management and sustainability issues is based on work in several international (Erasmus +, Interreg Europe) and national (ERDF, FLPP) research and education projects as a project manager, coordinator and researcher. The research component in working with students is provided by participation in scientific conferences and more than 50 publications in areas of competence. RTU pedagogical qualification upgrading courses and various seminars have been regularly attended, ensuring the knowledge of the latest trends in the field, promoting acquisition of new pedagogical and professional methods, which allow students to acquire latest developments related to the industry. The opportunities of the Erasmus + academic staff exchange programme have been taken by periodically going to foreign universities for experience exchange. Participation in the development of modular vocational education programmes and in the development of the digital teaching tool “Manufacture of sewn products”. Participation in the work group in the development of the professional standard “Clothing and textile technologist”. Director of IDT since 2017 and Head of the Department of Clothing and Textile Technology since 2016. Expert of the Latvian Council of Science since 2010 in the Materials Science sub-branch – Textile and Clothing Technology. Several awards granted by the Prime Minister of the Republic of Latvia have been received for preparing excellent contestants for participation in the European Young Professionals Skills Competition “EuroSkills” in the field of fashion technologies.

Uģis Briedis, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT associate professor at the Department of Clothing and Textile Technologies. Professional experience: more than 15 years of pedagogical work, working as a research assistant, lecturer,

assistant professor, researcher, leading researcher and associate professor. Fields of research: research of technological solutions for smart and functional clothing (sub-fields: use of alternative energy sources in smart textiles; use of embroidery technology in prototypes of technical textiles); the latest equipment and technologies for the production of sewn products. Participation in scientific conferences and development of publications for industry journals ensures the acquisition of the latest technologies and equipment and the research components for academic work. Supervisor of Bachelor and Master theses. Attended RTU pedagogical qualification improvement courses, seminars and international exhibitions of the field, which ensure knowledge of the latest trends in the clothing and textile industry, promote the acquisition of new methods that allow students to learn about the topicalities related to the field. Expert of the Latvian Council of Science in the field of science ”Engineering and Technologies – Materials Science”. Participation in the development of modular educational programmes for professional qualifications. One of the authors of the digital teaching tool “Manufacture of sewn products”. Regular participation in international research projects. Membership in industry associations. Practical experience as a sales manager at Brother industries, Ltd (Sonika Ltd.). He is the author of the patent "Active Wetness Sensor Comprising Textile".

Inga Dāboliņa, Dr. sc. ing, RTU, the Faculty of Materials Science and Applied Chemistry IDT associate professor at the Department of Clothing and Textile Technologies, laboratory manager. Participates in the provision of the study process since 2001. In 2010, she obtained a doctoral degree in engineering. Experience in clothing development 2D and 3D technologies has been gained since 2002. Knows several specialized 2D CAD/CAM systems for clothing design and production (Lectra, Grafis, Comtense, Vidya, Staprim) at the expert level. Since 2007 she has mastered and has gained experience working with a 3D garment fitting system. Performs experimental and practical approbation of 3D scanning system Vitus Smart XXL for study and research purposes, has a good knowledge of 3D body measurement analysis system AnthroScan. From 2016 to 2019, she was the scientific leader and leading researcher in the project “Smart and Safe Work Wear Clothing”, one of the main tasks of which was the improvement of functional clothing. The project was implemented very successfully, which proves I. Dāboliņa’s knowledge and experience in the field of functional clothing. Regularly conducts professional development in the acquisition of specialized systems, Erasmus + mobility program, as well as participates in scientific conferences both with reports and as a section leader. I. Dāboliņa is involved in the subgroup of “Fit” group of the standardization commission for “IEEE 3D Body Processing”. Since 2020, she has been the head of the Research Laboratory of Ergonomic Electrotechnics. Expert of the Latvian Council of Science in the field of science Engineering and Technologies – Materials Science.

Jānis Dāboliņš, Dr. sc. ing. in computer science, RTU, the Faculty of Materials Science and Applied Chemistry IDT assistant professor at the Department of Design and Materials and researcher at RTU FIDT. Professional experience: academic work experience of 15 years in a higher education institution by specialising in assessment of training and use of applications of computer controlled design, production systems (CAD/CAM), which is attested by participation in scientific projects and research programs, participation in international scientific conferences and publications (totally nine, five of them in Scopus). Students acquire knowledge in automation of documents by using software engineering languages, reflection of production processes in graphs, data processing and data visualisation. The most recent and topical tools are integrated in the study process.

Ilze Gudro, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT assistant professor at the Department of Design and Materials Technologies, director of RTU Research Center for Engineering History (RCEH). Academic and scientific work experience in a higher education institution (RTU) since 2011. Scientific work experience is based on 26 scientific publications, one published book, work as a scientific reviewer for a scientific monograph, work as a leading reviewer

for a scientific monograph. The conducted courses are related to interior design, design analysis and criticism, management of design events, organization and management of various events, attraction of companies for collaboration organizing practical classes, as well as organizing charity projects with Master's students. Her main academic interests are the history of RTU, the history and development of Latvian design, engineering, interior, furniture and product design, and materials science.

Inese Kašurina (previously – Parkova), Dr. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT researcher lecturer. Scientific experience: Author and co-author of 20 scientific research publications, 6 of which are included in recognized databases (Scopus, Web of Science, SciFinder, Ebsco). The results of the research are reflected in the collections of articles of international conferences, scientific journals and other scientific publications recognized by the Latvian Council of Science. Participation in international scientific conferences delivering oral and poster presentations. Registered Latvian patent No. 14680. "Flexible light-emitting textile display designed with floats for covering electronic devices". As a researcher she has participated in international research projects. In 2012, she had an internship at The Swedish School of Textiles of the University of Borås as a visiting researcher working with smart textiles. Academic experience: Since 2019, (she has been)conducting courses for Bachelor, Master's and Doctoral level students. Performs supervision and review of graduation papers in Master's and Bachelor's professional studies. In 2011, she won the Werner von Siemens Excellence Award in Science. In 2010 she was included in the RTU Golden Fund selection. Participated in professional development and training seminars. Member of the Project application evaluation committee of Knowledge and Innovation Community "Manufacturing" (EIT Manufacturing) of the European Institute of Innovation (2019, 2020).

Edgars Kirilovs, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT Department of Design and Materials Technology, Associate Professor since 2020, Leading Researcher since 2014 and Head of the Department since 2017. Professional experience: more than 10 years of academic experience in a higher education institution, nine years of practical experience in furniture manufacturing and design companies. Scientific activity and research have been carried out for more than 10 years, specializing in the design and engineering of wood products, adapting the aforementioned to the possibilities of modern technologies. The opportunities of the Erasmus + academic staff exchange programme have been used by periodically going to foreign research institutes to exchange experience. Renewable resource boards used for room comfort (acoustics, heat storage capacity) and furniture material structures are researched and developed, as evidenced by participation in international scientific conferences and publications. Competence in materials and technology issues is based on work in both international and national research projects as a project manager and a researcher. Expert of the Latvian Council of Science since 2014, in the Wood Materials and Technologies sub-field of the Materials Science field. Membership in the Furniture Producers Association in Latvia of Latvian Forest Industry Federation since 2017. Elaborator of the task in carpentry of the National Skills Competition for Young Professionals "Skills Latvia 2017" and nomination manager of the competition. The latest and most current scientific research, their results, current events from international industry exhibitions are integrated in the study process at all levels. The conducted study courses are related to two areas of specialization, wood products design, technologies and production (Wooden materials processing technologies and creative design), material development, research and integration into products (Fibre materials and product design conceptual models, Special course in research, Scientific work).

Silvija Kukle, Dr. habil. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT professor. Professional experience: academic work experience of 47 years in a higher education

institution, two years as a production manager, seven years as a member of the board of companies. Scientific activity and research have been carried out since 1976, working as an executor, responsible executor, visiting researcher and project manager, specializing in the development of software-controlled engineering systems, novel textiles modified at nano-level, functional nanofibres and laboratory prototypes of natural fibre-based composite. Has participated in international conferences both with reports and as a member and reviewer of the Scientific Committees of International Conferences. She is an expert of LATSERT and the Latvian Council of Science, the author of more than 200 scientific publications, as well as the scientific supervisor/co-supervisor of 12 successfully defended doctoral theses. In the academic work – conducting courses where students acquire research planning, data processing and interpretation methods, product, and process and consumer research. The study process integrates the latest and current scientific research in the field and its results; current developments are considered in the local and global context.

Jānis Ločs, Dr.sc.ing., RTU Faculty of Materials Science and Applied Chemistry professor, leading researcher. Academic work experience of more than 15 years, carrying out pedagogical, scientific and administrative work since 2005. Director of the Institute of General Chemical Engineering since 2018. The conducted study courses can be divided into two large directions – Chemistry, Chemical Technology and Biotechnology; Physics, Material Science, Mathematics and Statistics. Experience in Chemical Technology and Material Sciences – synthesis and characterization of inorganic and biomaterials, as well as experience in the development of materials and technologies for the application in medicine. Experience in coordination and supervising of scientific projects, including Horizon 2020 and ERA-Net. Development of international cooperation networks with the world's top academic and research institutions. An expert of the Latvian Council of Science.

Remo Merijs-Meri, Dr.sc.ing., RTU Faculty of Materials Science and Applied Chemistry. Professor. Field: Material science (Polymers and composite materials). Conducting lectures, laboratory work and practical classes in the study course "Specialized bio-nanotechnologies", etc., The development and approbation of teaching materials; participation in the EU, bilateral and national research projects; national research project management; participation in the performance of contract work with producers; supervision of student qualification papers (incl. Doctoral Theses): since 2004 Bachelor's and Master's qualification papers have been regularly supervised. Supervised Doctoral theses – "Development of Innovative Polyol Systems from Recycled Polyethylene Terephthalate and Renewable Raw Materials for Rigid Polyurethane Foams", "Synthesis of Silyl - terminated Polyurethene-type Prepolymers and Creation of Two-Component Systems" and "Extraction of Polymer Composites Obtained from Renewable Sources with Improved Functional Properties". An expert of the Latvian Council of Science.

Aleksandrs Okss, Dr. habil. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT associate professor in the field of materials science. Academic and scientific work in the higher education institution has been performed since 1983 specializing in mechanics, and clothing and textile technology. Work experience is based on more than 50 scientific publications. The conducted courses are related to knitting technology (Basics of knitting design and technology), design and application of smart textile products. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process.

Gaļina Terļecka, Dr. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT assistant professor, lecturer and researcher. Academic and scientific work in the higher education institution has been performed since 2007, specializing in Clothing and Textile Technology. Work experience is based on 17 scientific publications. The conducted study courses are related to clothing design, technology, and sizing. The latest references and the most current scientific research in the mentioned fields have been used in the study process. As a researcher and expert, she has

participated in several international and national research projects. Participated in professional development and training seminars. Participated in the development of modular professional education programmes “Professional Qualifications in the Textile, Clothing, Leather and Leather Products Industry” and in the development of the professional qualification exam programme of the module “Block Pattern Grading”.

Andra Ulme, Dr. arch., RTU, the Faculty of Materials Science and Applied Chemistry IDT associate professor and leading researcher at the Department of Design and Materials Technologies. Member of the working group for the development of the professional Master’s study programme “Materials Design and Technology”, an expert. Professional work experience since 1987. Academic and scientific work in a higher education institution has been performed since 2004, specializing in interior design, product design, material design and technology. The courses conducted can be divided into two areas of professional competence and are related to design theory and solving issues of art pedagogy. Work experience is based on more than 45 scientific publications. Competence in design and technology project management and sustainability issues is based on work in several international (Erasmus +) and national (ERDF) research and education projects as a project expert and researcher. Participation in international scientific conferences in the fields of materials science, pedagogy, architecture and construction, including publications and reports on the progress of scientific research. The study process includes the latest findings and the most relevant scientific research in the above mentioned fields, which have been gained by constantly improving her qualification taking courses, taking part in scientific conferences and seminars. Conducting of the course is based on 25 years of experience in managing construction projects in the field of architecture and interior design, arranging international design exhibitions, in internship preparing and training designers in a design company – more than 60 new specialists in 15 years. Scientific activity and research is carried out in the following areas: pedagogy in the field of art and architecture, ergonomics, sustainable environmental development and wood architecture, design and problems and tendencies of interior furnishing. During 16 years, more than 40 Bachelor and 26 Master theses have been successfully supervised and defended, doctoral theses in architecture and urban planning have been reviewed, and one doctoral thesis in materials science has been conducted. Participates in several scientific and practical international projects. Since 2018, participates in international scientific and academic collaboration with the Southern Federal University Academy of Architecture and Arts, the State Museum-Reserve Sholokhov Rostov Regional Branch of VOOPIK, Union of Architects of Russia. Within the framework of academic staff mobility, since March 2019, two study courses for architecture students of the Academy’s doctoral study programme.

Aleksandrs Vališevskis, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT leading researcher. Professional experience: more than 15 years of research work, including more than 10 years in the field of smart textiles, working as a research assistant, researcher and leading researcher. Master's degree in Computer Science. Participates in the management of study course: “Functional and Smart Clothing Development and Research”. Research areas: research of technological solutions for smart and functional clothing (sub-areas: use of alternative energy sources in smart textiles; use of embroidery technology in technical textile prototypes); integration of electronic components in smart textiles. Participation in scientific conferences and development of publications for industry journals ensures the acquisition of the latest technologies and equipment. Consultant for Bachelor and Master theses as well as for doctoral theses. Participation in the development of modular education programmes. Regular participation in international research projects.

Svetlana Vihodceva, Dr.sc.ing., RTU Faculty of Materials Science and Applied Chemistry. The leading researcher of Research Laboratory of Functional Materials Technology. Dr.sc.ing. in

Engineering was acquired in 2014 in the field of Materials Science, Textile and Clothing Technology for the research “Extension of the Range of Textile Modified at Nano-Level”. The Latvian Academy of Sciences Young Scientists Award was awarded In 2015. By 2021, one (1) Master Thesis and one (1) Bachelor Thesis were co-supervised. In 2019, a postdoctoral project was launched. Participation in ERDF projects, international scientific conferences, training schools and seminars, internships abroad (Institute of Natural Fibres and Medicinal Plants Textile Laboratory, Poland; National Institute of Chemical Physics and Biophysics, Estonia). Additional education and courses: “Project Management”, “Biotechonomy”, “Innovation through Design: Think, Make, Break, Repeat”, etc.

Zane Zelča, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT assistant professor and leading researcher. Dr. sc. ing. obtained in 2019 in the field of Materials Science in the sub-branch of Wood Materials and Technologies for the research “Expansion of the range of hemp-based composites and optimization of technologies”. In 2014, She won the Werner von Siemens Excellence Award in Science. Academic work experience of 5 years in a higher education institution. The conducted courses can be divided into two areas of professional competence and are related to the use of fibrous materials (Wood Processing Technologies and Creative Design, Conceptual Models of Fibre Materials and Product Design), and scientific activities (Research planning and analysis, Scientific research and one Bachelor thesis have been co-supervised. Since 2020, one doctoral thesis is being co-supervised. She has experience in developing e-commerce and marketing projects, internship in the design company Alfa LogHouses and in the pharmaceutical company Silvanols. Participation in ERDF projects, international scientific conferences, lectures delivered in design-related secondary schools and creative workshops as a guest lecturer. Expert rights of the Latvian Council of Science in the field of materials science since 2020.

Inese Ziemele, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT Associate Professor, Department of Clothing and Textile Technologies. Director of the study programmes WCV0, WDV0 “Clothing and Textile Technology” and the study direction “Manufacture and Processing”. Professional experience: more than 20 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, leading researcher and associate professor. Research areas: sewn products manufacturing technologies, their management and logistics of clothing factories; research on technological solutions, and smart and functional clothing comfort; clothing assortment and quality research. Practical work experience in the position of a company sewn products manufacturing technologist. Research components in work with students are provided by participation in scientific conferences and development of publications. Periodically attends Erasmus + mobility activities in foreign universities, giving lectures at foreign universities, as well as participating and reporting at scientific conferences. Regularly supervises Bachelor and Master theses. Attended RTU pedagogical qualification upgrading courses. Additional regular participation in various seminars and international exhibitions of the industry, ensuring knowledge of the latest trends in the clothing and textile industry; promotes the acquisition of new methods, which allows students to acquire current developments related to the industry. She is an external member of the Sectoral Expert Council (NEP) (Textiles, Clothing, Leather and Leather Products Industry). Participated in the development of modular educational programmes and examination tasks for professional qualifications. One of the authors of the digital teaching too “Manufacture of sewn products”. Regularly participates in international research projects. She has been a member of the jury commission of the National competition for young professionals SkillsLatvia.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the 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 may be additionally specified (if applicable).

As from 2013, the scientific research performed by the academic staff and their results in the fields relevant to the Ph.D. study program have been published in 403 scientific articles, 2 monographs and chapters of six scientific monographs. 234 of them have been published in SCOPUS data base and 95 in SCOPUS and/ or WoS data base. The overall review is presented in Table 4.2 below.

Table 4.2

Published scientific research during the report period in the fields relevant to the study program, 2013-2021

Type of publication	Number	SCOPUS	WoS
Scientific monographs or collective monographs	3	-	-
Articles or chapters in collections of articles/ scientific books	8	4	2
Scientific articles in journals	183	116	45
Scientific articles in conference collections of articles	134	106	48
Conference thesis	65	-	-
Total:	393	226	95

The full list of publications and patents of study fields relevant for the study program is provided in Annex 8. There have been publications in many Open Access and other scientific journals: Advances in Science and Technology Research Journal (ASTRJ) ISSN: 2299-8624; Journal of Nano- and Electronic Physics ISSN: 2306-4277; Composites Part B: Engineering ISSN: 1359-8368; Advances in Materials Science and Engineering ISSN: 1687-8442; Soft Materials ISSN: 1539-4468; Materials Today Chemistry ISSN: 1369-702; International Journal of Engineering & Technical Research ISSN: 2321- 0869; Journal of Functional Biomaterials ISSN: 2079-4983, Buildings ISSN: 2075-5309; Industria textile ISSN: 1222-5347; International Journal of Clothing Science and Technology ISSN: 0955-6222; Materials Letters ISSN: 1873-4979; Polymer Engineering And Science ISSN: 0032-3888; Renewable Energy ISSN: 0960-1481 and other.

Below Table 4.3 summarises the number of publications of the academic staff and citations in the fields relevant to the study program

Table 4.3

The number of publications of the academic staff involved in the study program and citations in the fields relevant to the study program 2013 -2020.

Name, surname	SCOPUS	WoS	Springer	EBSCOhost	Total number	Citations SCOPUS
Ilze Baltiņa	14	7	0	1	30	28
Dana Beļakova	13	12	0	6	26	16
Uģis Briedis	7	7	1	3	8	25
Inga Dāboliņa	16	9	1	3	23	17
Jānis Dāboliņš	4	3	1	2	9	11
Ilze Gudro	1	1	0	2	15	20
Inese Kašurina (Parkova)	5	4	0	5	12	4
Edgars Kirilovs	10	5	0	10	15	13
Silvija Kukle	46	32	2	4	84	116
Jānis Ločs	66	47	2	16	115	495
Remo Merijs- Meri	50	19	5	10	95	194
Aleksandrs Okss	14	5	4	0	33	28
Gaļina Terļecka	1	2	0	1	6	1
Andra Ulme	3	2	0	8	12	0
Aleksandrs Vališevskis	7	7	1	3	11	16
Ausma Vilumsone	14	11	1	9	33	25
Svetlana Vihodceva	12	10	0	6	18	38
Zane Zelča	17	10	1	6	28	33
Inese Ziemele	6	6	0	7	19	4

Graph 4.2 reveals that the topicality of publications of research works performed by IDT is increasing, and they are cited by researchers on the global scale.

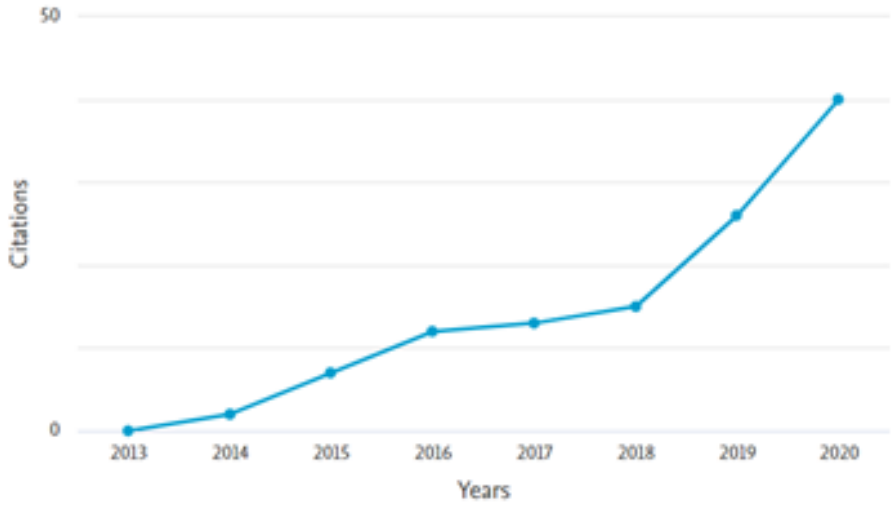


Figure 4.2 Citations of the publications of the Institute of Design Technologies (IDT) (SCOPUS) in the period 2013 - 2020.

Information about major publications is provided below.

Šutka, A., Kukle, S., Gravitis, J., Milašius, R., Malašauskiene, J. (2013.). Nanofibre electrospinning polyvinyl alcohol) and cellulose composite mats obtained by use of a cylindrical electrode. Advances in Materials Science and Engineering, 932636 (20 citations in SCOPUS).

Substantiation: A research project on the nano-fibre composite produced in the electrical spinning process from polyvinyl alcohol solution with added hemp fibre and shives was performed. Combined vapour explosion, ball-type milling, and high intensity ultrasound treatment method is applied for preparing cellulose nano-fibre from hemp fibre and shives. The produced nano-web of composite materials has been studied by using the reflection Fourier transformation infrared spectroscopy. Morphology of the surface of celluloses nano-fibre composites was studies by applying the scanning electron microscopy.

Sutka, A., Sutka, A., Gaidukov, S., Gravitis, J., Kukle, S. (2015). Enhanced stability of PVA electrospun fibers in water by adding cellulose nanocrystals. Holzforschung, 69(6), pp. 737–743. (12 citations in SCOPUS*)*

Substantiation: The article presents the original technology developed within the framework of the Ph.D. for production of celluloses fibre-type crystals with 20-30 nanometre diameter from the waste of the traditional hemp fibre production process, namely, shives, and another original technology for weaving the nanofibre produced from shives into polyvinyl alcohol matrix. Addition of the shives cellulose component in the amount of 15 to 20 mas% allows reducing the diameter of the composite fibre 2-4 times in comparison to fibre woven from PVA 10 mas% solution, as well as there is a considerable increase of the yield tensile strength of the produced web (by 450%) and elasticity module (by 670%). It was proven for the first time that the produced PAV/NC nanofibre web without additional or physical modifications does not dissolve in the water environment, the effect was achieved by only adding nano-cellulose produced from shives to the PVA weaving solution. The obtained know-how and technologies serve as the basis for development of high-performance filters for operation in environments with high relative humidity.

Neibolts, O. Platnieks, S. Gaidukovs A., Barkane, V.K. Thakur, I. Filipova, G. Mihai, Z. Zelca, K. Yamaguchi, M. Enachescu (2020). Needle-Free Electrospinning of Nanofibrillated Cellulose and Graphene Nanoplatelets Based Sustainable Poly (Butylene Succinate) Nanofibres. Materials Today Chemistry, 2020, 17, 100301. (11 citations in

SCOPUS)

Substantiation: Sustainable materials have gradually become an important area in the research of nano-fibre, and adaptation of their properties and improvement of industrial production present major challenges. The article reports on preparation of nano-fibre which are biologically degradable, produced from polybutylene succinate with inclusion of nanofibrilated celluloses and grapheme nanoplates. Fibre is produced by applying the needle-free electrical spinning method which is approximated to industrial production. The total content of nanofibralated celluloses and graphene nanoparticles was 0.5 and 1.0 wt% accordingly, and polyethyleneglycol (PEG) was used for improving the interaction of filling substances in the polymeric matrix. This approach of filling substances turned out to be most appropriate for consistent and high-quality production of nano-fibre. The produced web structures could have predictable potential use in the field of biomedicine, for example, for restoration of tissues and bones, and other fields of application could focus on filtering technologies and smart sensors.

Freivalde, L., Kukle, S., Andžs, M., Bukšans, E., Gravitis, J. (2014). Flammability of raw insulation materials made of hemp. Composites Part B: Engineering, 2014, 67, pp. 510-514. (10 citations in SCOPUS)

Substantiation*:* Considering that natural materials are more sensitive to flammability, the research analyses the flammability properties of non-woven cloth of natural fibre. The article presents the results of the reaction to fire test of the samples of non-woven hemp fibre insulation materials. For production of cloth samples from the hot web, spurting, thermal joining and needle punching technologies were applied. The report in particular analyses the flammability in order to identify the effect of the fibre properties and non-woven cloth production technologies thereof.

Vihodceva, S., Kukle, S. (2012) Cotton Fabric surface modification by sol-gel deposition of ZnO thin films. IOP Conference Series: Materials Science and Engineering, 2012, 38(1), 012022 (7 citations in SCOPUS)

Substantiation: Increase of the value of natural textile materials by adding ultraviolet absorption and antin-mircobe protection properties to them by application of ZnO nano level coatings is among the main tasks of research. ZnO nanoparticles demonstrate high absorption within the area of ultraviolet radiation of the light spectrum in comparison to organic absorbents, which are usually used in the textile industry. Zinc oxide nanoparticles do not degrade, they are stable and are classified as non-toxic material. Nano-sols are synthesised by using the sol-gel technology. This research compares samples coated with nano-sols and modified with zinc acetate and zinc sulphate. Scanning electron microscopy was applied for the surface micro-graphic analysis. The energy dissipating X-ray spectroscopy was applied for analysis of the element content of modified samples.

Oks, A., Katashev, A., Zadinans, M., Rancans, M., Litvak, J. (2016). Development of smart sock system for gate analysis and foot pressure control. IFMBE Proceedings, 2016, 57, pp. 466-469. ISBN: 978-331932701-3 (12 citations in SCOPUS).

Substantiation: The article presents a wireless system for analysis of the human pace and the plantar feet pressure distribution based on the developed smart socks with integrated knitted pressure sensors. The system validation was performed by comparing and analysing various asymptomatic and flat feet running and walking regimes. The developed system revealed potential possibilities for determining the human pace and its potential use in the medicine and sports field.

Briedis, U., Valisevskis, A., Grecka, M. (2016). Development of a Smart Garment Prototype with Enuresis Alarm Using an Embroiderymachine- based Technique for the Integration of Electronic Components. Procedia Computer Science, 104, pp. 369-374. (8

citations in SCOPUS)

Substantiation: Smart textiles is a modern, fast growing inter-disciplinary research field. Connection of incorporated electronic components presents a major issue related to production of smart clothing. As the traditional hard-pressed plates are not suitable in most cases, the possibility of incorporating the electric chain paths by using electricity conducting strings and connecting electronic components by using a semi-automated embroidery machine is investigated. This approach has several advantages - clothing maintains elasticity, the process and material costs are low, moreover, this allows reducing the production time, at the same time minimising the component sizes. The article describes the whole design process starting from development of the pressed plate until embroidery and testing of the electrical chain. The developed prototype is a set of children underwear with a built-in alarm clock and a humidity sensor. It is envisaged for treatment of enuresis for children under the age of five years.

Radavičiene, S., Juciene, M., Juchnevičiene, Z., Čepukone, L., Vilumsone, A., Briedis, U., Baltina, I. (2014). Analysis of shape nonconformity between embroidered element and its digital image | Suprojektuoto ir realaus siuvinėto elemento formos neatitikimo tyrimas. 20(1), pp. 84–89 DOI: 10.5755/j01.ms.20.1.2911 (9 citations in SCOPUS).

Substantiation: The article presents embroidery technology, they are widely used for incorporation of decorative elements of the original design in clothing, in clothing intended for protection and other products. Non-compliance of the shape and sizes of the embroidered element to the designed digital image is affected by the properties of embroidery threads and fibre, the type of filling of the embroidery, density of stitches and other technological parameters. The effect of the actually embroidered elements, cloth properties and the direction of stitches upon the compliance of the shape with one of the designed digital images has been studied.

Kirilovs, E., Krūklīte, L., Kukle, S., Zelča, Z. (2015). Nanolevel finishing for veneered products. Environment. Technology. Resources - Environment, Technology, Resources 1, pp. 56-60 (2 citations in SCOPUS)

Substantiation: Wood veneer is often used in various real estate segment for interior decoration. Loss of colour under the impact of natural and artificial lighting should be mentioned among the drawbacks of the veneered surfaces. New finish needs to be developed to minimise it. A new nano-level coating is offered for wood veneer finish based on the sol-gel process. It is known that the sol-gel technology is a generally recognised process for generation of colloidal nanoparticles from the liquid phase, and during recent years it has been further developed for production of modern coatings. It is well adjusted for synthesis of oxide nanoparticles and composites. The main advantage of the sol-gel technology is comparatively low processing temperature, offering unique possibilities to produce organic and non-organic materials.

The sol synthesis and application technology, as well as the protective properties of the developed coating are described.

Kisis, A., Kirilovs, E. Innovative joint system for small frame structural connections (2019). International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM, 19(4.1), pp. 255-262.

Substantiation: The research was aimed at development of innovative, hidden wood material joints without additional installation tools and to determine mechanical properties of joints. The strength, robustness and elasticity module of the "T" type hidden flat pin, flat pin inserts and the cross-binding was determined under the conditions of tension, bending and shear force according to the requirements of international standards for joints of indoor and outdoor structures of wood materials. The accuracy of the strength, deformation and elasticity module of the tested binding

samples is with a positive outcome in both experimental research and numerical calculations.

Belakova, D., Seile, A., Kukle, S., Plamus, T. (2018). Non-Wovens as Sound Reducers, Latvian Journal of Physics and Technical Sciences, 2018, 55(2), pp. 64-76.

Substantiation: Non-woven materials are perfectly suitable for use in acoustic insulation products because the placement of fibre creates porous material structure causing more interaction between sound waves and fibre structure. The research analyses the effect of the surface density, the thickness and number of fibre net layers of hemp and polyactide non-woven cloth on the sound absorption coefficient and the sound transmission loss within the frequency range from 50 to 5000Hz. Sound insulation properties of experimental samples have been determined in comparison to the ones usable in practice and the possible use of the material in car building has been identified.

Dāboliņa, I., Viļumsone, A., Dāboliņš, J., Strazdiene, E., Lapkovska, E. (2018). Usability of 3D anthropometrical data in CAD/CAM patterns. International Journal of Fashion Design, Technology and Education, 2018, 11(1), pp. 41-52. (8 citations in SCOPUS)

Substantiation: The research is aimed at anthropometric measurements of the human body and their automated application in clothing CAD/CAM systems. The human body measurements were obtained with 3D scanning and processed by using the system ScanWorx - automated data retrieval software. Following data processing, their selection and creation of new files was performed by applying new software which was procured for reading measures.ascii.csv files and saving CAD system Grafis measurement tables. Thus, a solution has been found for processing of the scanned measurement data of the human body and their automated inclusion in CAD/CAM systems, thus avoiding routine work. The templates desgined in the result of use of the data were tested by producing clothing body base structure samples, evaluating their fit and look. Automated use of the scanned body data ensures bringing of the automated clothing design processes to the top level.

Most important scientific monographs and chapters in monographs:

Kukle, S., Šutka, A., Grāvītis, J. (2015). Hemp Fibres and Shives, Nano- and Micro-Composites. Sustainable Development, Knowledge Society and Smart Future Manufacturing Technologies World Sustainability Series. W.Filho, A.Ūbelis, D.Bērziņa red. Cham: Springer International Publishing, 2015. pp. 291-305. ISBN 978-3-319-14882-3. e-ISBN 978-3-319-14883-0. DOI 10.1007/978-3-319-14883-0_22.

Substantiation: The article presents the simulation of the structure of hemp as the nature composite where crystallic cellulose micro fibriles are included in the lignine and hemicellulose matrix. Hemicellulose and, to some extent, pectin are the primary components of the binder which glue elementary fibre. Lignine is the stabiliser of fibrogen macro structurer and screener. In a range of applications, it is necessary to split this natural composite in its forming components. Sulphite and sulphate processes polluting the environment are still used in practically all chemical processes of hemp base cellulose production. The environment described in the article is a more environmentally friendly vapour explosion method for splitting of technical hemp fibre is smaller bunches and individual elementary parts and the experimental study of the parameters of the original relevant process by analysing waste following each process stage, assessing the pressure effect and the outcome of celluloses components from unsoaked and dew-soaked hemp fibre and shives.

Strautmanis I., Ulme A. (2013). Architecture of Riga hotels. Pētergailis, Riga p. 396

Substantiation: Hotels and the history of their construction have an important role in the architecture of Riga. The book presents an extensive material covering the construction and

reconstruction processes of the most famous historical hotel buildings and the construction processes of new buildings, and chapters on the universal design, the hotel certification system allow learning about the requirements serving as the basis for the international hotel classification.

Emsiņš, J. (2014). Wood in the life of the Latvian state and nation. Jelgava: Students' Association "Šalkone", 2014. 202 p. ISBN 978-9984-48-166-1.

Substantiation: The book compiles the history of wood processing in the territory of Latvia until restoration of independence in 1990.

Blūms, J., Gorņevs, I., Terļecka, G., Jurķāns, V., Viļumsone, A. (2018) Wearable Human Motion and Heat Energy Harvesting System with Power Management. Energy Harvesting. R. Ochieng Manyala ed. England: INTECHOPEN LIMITED, Registered in England and Wales, 2018. pp.21-40. ISBN 978-953-51-5992-6.

Substantiation: Study of a combined system of collection and transformation of human movement and heat energy. The main components of the developed system are flat spiral-type inductors. Voltage impulses in such flat inductors may be caused during the permanent magnet movement along its surface. Thanks to their flat structure, inductors can be fully integrated in parts of clothing and no additional space needs to be allocated to the magnet movement, as it is usually in electromagnetic energy collectors. Clothing prototypes with an integrated aroused human movement energy collector have been produced and tested. It is demonstrated that the voltage of generated impulses is sufficiently high to be efficiently improved with commercially available diodes, it is ready for storing; however, efficiency depends on the properties of the control chain. In order to improve the sustainability of the energy source, the possibility of combining the movement energy collector with the human body heat collector is considered. A thermal electrical generator which generates electricity from the heat from the human body is presented, and the generated voltage and capacity is compared at various activity levels and ambient temperature. The generating capacity of a thermal generator located on the lower leg was up to 35 mW at the maximum voltage reaching 2 V under certain circumstances.

Dāboliņa, I., Lapkovska, E., Viļumsone, A. (2019) Functional Textiles and Clothing/Dynamic Anthropometry for Investigation of Body Movement Comfort in Protective Jacket. Functional Textiles and Clothing. A. Mujumdar, D. Gupta, S. Gupta red. Singapore: Springer Nature Singapore Pte Ltd., 2019. pp. 241-259. ISBN 978-981-13-7720-4. e-ISBN 978-981-13-7721-1. Available from: doi:10.1007/978-981-13-7721-1

Substantiation: The research is aimed at the human body measurements and movements - their maximum ranges in forced positions and positions characteristic for performance of certain work. The analysis of the working positions and IMP was performed for 155 men who serve in the National Armed Forces of Latvia. Two positions were selected in the result of tests of different positions, i.e., leaning forward and squatting. Results of measurements of both positions were compared to the body measurements done at the standard upright position. Measurements were done by applying the contactless anthropometric method - 3D scanning of the human body. Results were analysed and classified for the whole sample. Scanning results for the standard position were compared to the traditionally obtained anthropometric data - the primary measurements were obtained by a measuring tape and an anthropometer. The analysis of the prominent measurements of performing the above two positions in the research was performed via the correlation method in order to assess the repeatability of the positions. However, no correlation was found which could be described by regression equations. In order to analyse a protective clothing jacket, one of the subjects was scanned by using physical markers for labelling the anthropometric points. During performance of several working positions, various movements of anthropometric points were

identified. The results indicate the necessity of further research in the area of anthropometry, dynamics and movement range.

Dāboliņa, I., Lapkovska, E. (2020) Sizing and Fit for Protective Clothing. *Anthropometry, Apparel Sizing and Design.* N. Zakaria, D. Gupta ed. Cambridge: Woodhead Publishing, 2020. pp.289-316. ISBN 978-0-08-102604-5. e-ISBN 9780081026052. Available from: doi:10.1016/B978-0-08-102604-5.00011-1.

Substantiation: The chapter presents the meaning and origin of protective clothing and personal protective equipment (hereinafter - PPE), by explaining their importance in protection of the human body and the necessity to ensure their good fit and look. The chapter includes the requirements regarding sizing and fit of protective clothing and PPE, by describing the types of IMP and explaining the necessity for appropriate products. The review of anthropometry in the field of protective clothing is included in relation to the traditional anthropometry, characteristics of the users' population, the importance of the dynamic anthropometry, the requirements of systematisation of sizes and use of 3D scanning and virtual prototyping. Review of the aspects of design of protective clothing, including ease allowances, dynamic ease allowances, design and adjustment solutions. A section is included reviewing the parameters of cloth affecting the fit - weight and volume, interaction of the clothing layers and clothing care effect. The last section presents PPE compliance tests by applying performance tests, as well as the mobility study possibilities.

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).

During the report period, the academic staff involved in the study program implemented and participated in various international and national scientific projects as project managers, main performers, leading researchers. There is a positive trend in the number of post-doctoral projects implemented and commenced by the new scientists.

Source of financing	Project title	Implementation period	Funds (EUR)
ERDF, 1.1.1.2. "Post-doctoral research support"	"Antibacterial and Antiviral Nano and Micro Fibrous Materials for Bioprotective Applications". Project type: ERAF, post-doctoral project. Scientific supervisor of the project: prof. **S. Kukle**, the project implemented by the leading researcher **Z. Zelča**. In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=4438	01.01.2021 – 30.06.2023.	111,504
LSC	"Durability of sustainable biopolymeric nano-composites under the combined impact of mechanical load and environment ageing". Project: LSC Involved academic staff: the leading researcher, prof. **R. Merijs - Meri**. in Latvian: https://www.lu.lv/zinatne/programmas-un-projekti/nacionalas-programmas-un-projekti/ilgtspejigu-biopolimeru-nanokompozitu-ilgizturiba-mehaniskas-slodzes-un-apkartejas-vides-novecosanas-kombinetaja-ietekme/	01.12.2020 – 31.12.2021	100,389
VPP	"Integration of reliable technologies for protection against Covid-19 in healthcare and high risk areas". scientific supervisor: T. Juhna. Involved academic staff, researchers: Prof. **I. Baltiņa**, assoc.prof. **I. Dāboliņa.** In Latvian: https://lzp.gov.lv/project/drosu-tehnologiju-integracija-aizsardzibai/	01.07.2020 – 31.12.2020	497,580
ERDF, 1.1.1.2. "Post-doctoral research support"	""Development of novel antimicorbial coatings with sharp Z-scheme photocatalytic nanoarchitectures for indoor applications". scientific supervisor: A. Šutka. Involved academic staff and implemented by: the leading researcher, **S. Vihodceva.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3846	01.03.2019 – 28.02.2022.	133,805
ERASMUS+	"Innovative design practices for achieving a new textile circular sector". scientific supervisor of the project: assoc. prof. **D. Beļakova.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3745%2F2018	01.12.2018 – 30.11.2020.	299,105
ERA-NET	"Efficient and affordable water treatment technologies to minimise waterborne diseases". scientific supervisor of the project: L. Mežule. Involved academic staff: prof. **J. Ločš.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3358	02.01.2018 - 31.12.2020.	205,197
ERDF, 1.1.1.2. "Post-doctoral research support"	"Application of cold sintering process for preparation of biocerамics and biocomposites with enhanced properties". scientific supervisor: prof. **J. Ločš.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3849	01.01.2019. - 31.12.2021.	133,805
ERDF, 1.1.1.2. "Post-doctoral research support"	"Investigation of carbon containing materials and method development for heavy metal removal from water". scientific supervisor: prof. **J. Ločš.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3533	01.11.2018 – 31.10.2021.	133,805

ERDF, 1.1.1.5. "Support to international cooperation projects in research and innovation"	"Drug delivering 3D printed scaffold strategy brings human body implants to the next level of personalization". scientific supervisor: prof. **J. Ločs.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3593	31.07.2018 – 30.01.2021	181,700
ERDF, 1.1.1.2. "Post-doctoral research support"	"Structures and technology development of smart insulation materials for indoor microclimate regulation". scientific supervisor: prof. **S. Kukle**. Leading researcher, implementer: assoc.prof. **E. Kirilovs**. In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3284	16.10.2017 – 15.10.2020.	133,805
ERASMUS+	"Circular Economy Innovative Skills in the Textile Sector - ECOTEX". scientific supervisor of the project and implemented by: assoc. prof. **D. Beļakova.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=3481%2F2017	01.11.2017 – 30.04.2020.	163,493
ERDF, 1.1.1.1. "Practical research"	"Synthesis of textile surface coating modified in nano-level and energetically independent measurement system integration in smart clothing with functions of medical monitoring". scientific supervisor: prof. **S. Kukle.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=2588%2F2017	01.03.2017 – 31.12.2019	610,362
ERDF, 1.1.1.1. "Practical research"	"Hybrid energy harvesting systems" scientific supervisor: K. Mālnieks. Involved academic staff: leading researcher **S. Vihodceva.** In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=2540%2F2017	01.03.2017 –29.02.2020.	647,361
Interreg Baltic sea region	"Smart and Safe Work Wear Clothing (SWW)" scientific supervisor: assoc. prof. **I. Dāboliņa**. In Latvian: https://www.rtu.lv/lv/universitate/projekti/atvert?project_number=1970%2F2016	01.03.2016 – 28.02.2019.	2,438, 870
RTU	"Humidity absorption properties of hardwood veneer produced by Sol-Gel process". scientific supervisor: assoc. prof. **E. Kirilovs.**	01.05.2016 – 30.04.2017	2850
RTU	"Nonwovens as Sound Reduction Increasers". scientific supervisor: assoc. prof. **D. Beļakova.**	03.05.2016 – 30.04.2017.	3000
ESF	"Development of innovative technologies for maintaining and production of heat and cold". scientific supervisor: prof. **S. Kukle.**	01.12.2013 – 31.08.2015.	497,988
LSC	"Research of the properties of Latvian renewable raw materials - lax and hemp, their application for development of innovative technologies and new functional materials". Leading researchers, prof. **S. Kukle**, prof. **I. Baltiņa**, assoc.prof**. D. Beļakova**.	01.01.2010 – 31.12.2013	300,000

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

The academic personnel of the study program participates in scientific research on both the national and the international levels. Experience, knowledge, and the modern research methods acquired thereof are integrated into the study process. The academic personnel and Ph.D. students are actively involved in the scientific research of the topical matters of the textile and clothing technology sub-field, wood materials, and product technology sub-field of the materials science field. Research directions conform with the defined state priorities and are linked with RIS3 specialisation areas. Results of each research project (listed above in Section 4.4) are integrated into the study process.

As an example, the ERDF research project "**Synthesis of textile surface coating modified in nano-level and energetically independent measurement system integration in smart clothing with functions of medical monitoring**" (available only in Latvian) can be mentioned as an example, where, besides the scientific supervisor of the project, several academic staff members were involved (*D. Beļakova, I. Baltiņa, G. Terļecka, I. Ziemele, A. Okss, U. Briedis, A. Vaļiševskis*) and Ph.D. students successfully worked.

The project goal was to obtain knowledge and a better understanding of the development and improvement of smart clothing elements, like textiles, energy-independent electronic system,s and a measuring system based on textile sensors. Within the framework of the project, these elements were adjusted and integrated into the smart clothing set intended for the performance of medical observations in the field of orthopedics. The project research contributed to cross-sectoral cooperation. The project methodology and results are integrated into study courses. ***Research Methodology, Specialised Bio- and Nanotechnologies, Development and Research of Smart Textiles*.** Research in the project area is continued in the Ph.D. thesis "Modification of yarn, cotton and mixed fibre knitwear surface for performance improvement", the scientific supervisor S. Kukle.

The scientific goal of the post-doctoral ERDF project "**Structures and technology development of smart insulation materials for indoor microclimate regulation**" (available only in Latvian) is to develop a smart, transferring heat insulation material suitable for construction, for accumulation and return of latent heat with improved sound insulation properties, by using environmentally friendly components and bio-technologies, which will ensure effective regulation of indoor microclimate by allowing reduction of heating and ventilation costs, as well as to study the effect of the structure of this material upon heat insulation parameters and to approbate its production technology. The project results and methods are integrated into the study courses **"*Wood Processing Technologies and Creative Design*".** The research of smart insulation materials is continued in the Ph.D. thesis "*Expansion of the assortment of lignocelluloses insulation plates and performance analysis*", the scientific supervisor *E. Kirilovs.*

The goal of the interregional cooperation program INTERREG project **"Smart and safe work-wear"** (available only in Latvian) was to develop the business of design and distribution of work clothing in the Baltic Sea region by promoting its competitiveness. There is international cooperation in the area of design and market between the Baltic Sea region countries, however, not all the aspects have been studied yet. Therefore, the directions of the project research were adjustment of information, integration of new materials and technologies in work clothing, as well as improvement of the management of supply chains. In order to ensure attainment of the project goals, scientists and research instituted of five Baltic universities carried out extensive data collection, processing, and analysis, which forms the basis for the development of the prototypes of the new generation work clothing. The scientific supervisor of the project at RTU *I. Dāboliņa*, involved academic staff: *I. Baltiņa, D. Beļakova, A. Viļumsone, and 4 Ph.D. students*. The research methodology and results of the project related to ergonomically developed functionally smart and safe work clothing are included in study courses: **"*Functional and Smart Clothing Development and Research*", "*Methodology of Clothing Design*"**. The topic of the project is developed in the Ph.D. thesis "Improvement of the methods of assessment of the anthropometric fit and ergonomics of clothing", the scientific supervisor I. Dāboliņa.

ERASMUS+ Key Action 2 (KA2) “Cooperation for the performance of innovation and sharing of good practice", two projects of the knowledge association program: “**Innovative design practices for achieving a new textile circular sector – Design4Circle**” and “**Circular Economy Innovative Skills in the Textile Sector - ECOTEX**” (available only in Latvian), which were implemented jointly with partners from Romania, Portugal, Spain, Belgium, Macedonia, and Greece, were devoted to the development of sustainable products and implementation of sustainable production processes in the textile industry sector. The projects were led by *assoc. prof. D. Beļakova*. *A. Ulme, I. Dāboliņa, I. Ziemele, J. Dāboliņš* worked as researchers in projects. 3 Ph.D. students were involved in the projects. The teaching aids prepared during the implementation of the projects are intended for the competence development of the sector employees. They are included in several study courses: ***“Advanced Textile Technologies”, “Advanced Weaving Technology”, “Conceptual Models of Fibre Materials and Product Design”.***

IDT leading researcher, Assoc. prof. A. Okss, in cooperation with a professor from RTU Institute of Biomedical Engineering and Nanotechnologies, has created the smart textile undertaking “**Eho Textiles**” (available only in Latvian), which was founded in 2016 as a Spin-Off from RTU, and its headquarters are located in Helsinki, Finland, where the company uses the services of the prestigious business accelerator **Vertical** (available only in Latvian). “Eho Textiles” focuses on the development of innovative products which will allow people to get access to the advantages provided by "smart clothing" at comparatively affordable prices for the needs of various sectors, starting from just interested individuals, hobby representatives, and athletes, up to patients of physiotherapists and doctors. The methodology of implemented projects is included in the study

courses: ***Development and Research of Smart Textiles, " Research in Knitting Processes".***

During the reporting period (2017) under the leadership of I. Baltiņa, also several ***contractual research projects for the National Armed Forces of the Republic of Latvia and the Ministry of Defence of Latvia*** were implemented for the development of technical specifications of various functional clothing: investigation of the base cloth of the daily uniform jacket and development of a specification, development of the technical specification of the fire-resistant 4th level action jacket and trouser cloth and preparation of the specification. Ph.D. students were involved in the implementation of research projects within the framework of the study course ***"Textile Material Research"***.

The academic staff presents their research at conferences, seminars, work as reviewers, and members of committees of international scientific conferences. S. Kukle was a member of the scientific committee of the international textile, clothing, and design conference "*Magic World of Textiles*" (Croatia) in 2014 and 2016 and a reviewer of numerous international journals and conference articles. In 2019 A. Ulme worked in the international scientific-practical conferences "*Architecture and art: from theory to practice*" (Russian Federation, Rostov-on-Don) as a member of the organisational committee. I. Baltiņa has reviewed scientific articles in journals *Textiles and Light Industrial Science and Technology 2017 - 2018*; *Journal of Industrial Textiles 2016 – 2020*; *Cellulose 2020*. I. Baltiņa has also been a member of the science council of the 19th international scientific conference "Autex 2019". A. Viļumsone reviewed the article *"Nanodiamond Composite as Smart Coating for Textile Fabrics"* in the journal *Journal of Industrial Textiles*. I. Dāboliņa is a reviewer of scientific articles for the journal "Measurement", included in the reviewing system in the publishing house "Elsevier". I. Ziemele reviewed a scientific article in the journal "*Tekstilec*", Slovenia, and was a member of the science committee and a reviewer of articles of the international scientific conference "AUTEX 2017".

The academic personnel works as experts in the promotional councils of higher education institutions in Latvia and abroad. Professor S. Kukle has been a member of the promotion council, an expert at the defense of four Ph.D. thesis at *the Kaunas University of Technology,* and a member of the promotion council at *Tallinn University of Technology* for the defense of one Ph.D. thesis. Professor A. Viļumsone has been a member of the Assoc. Professor. Dr. A. Rudolf Habilitation commission at Maribor Univesity. The Assoc. professor I. Dāboliņa performed the duties of the official opponent at the pre-defense of the Ph.D. student of *Buros University of Textile* (Sweden) N. Hernandez. The above provides an insight into the topical research directions at partner higher education institutions and the process of training of new Ph.D. holders and its results.

4.6. 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 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 mutual link of study courses and their logical sequential acquisition plays an important role in attainment of the study program results. The sequence of acquisition of study courses and the links of study courses are discussed in Paragraph 2.2. For the purpose of promotion of cooperation between academic staff in the university as a whole, RTU has established a system which provides regular academic conferences and professional growth workshop training for improvement of

methodological competences. Exchange of experience and information related to the study work takes place:

- at the meeting of the IDT academic staff (monthly);
- during attestation of Ph.D. students in the structural unit and the faculty (twice a year);
- in academic conferences (annual);
- at the meetings of the promotion council;
- at scientific workshops, conferences, and other events.

Improvement of study courses by cooperation of the academic staff takes place regularly because in the majority of cases several lecturers are involved in implementation of study courses. Twice a year, by evaluating the progress of the work of Ph.D. students, also the content and sequence of study courses is discussed. The mutual links of study courses are described in Section 2.2. Improvement of study courses is based on the proposals of Ph.D. students, the development trends of the material science and branches of the national economy.

Totally 18 members of the academic staff are involved in implementation of the Ph.D. study program. The mean number of students has been 18 during the last four years, thus the ratio of students and academic staff is 1:1.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	1_pielikums_Studejoso_statistika_Annex_1_Statistics_on_students_D.pdf	1_pielikums_Studejoso_statistika_Annex_1_Statistics_on_students_D.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	2_annex_Doktora_programmas_atbilstiba_augstskolu_likumam.pdf	2_pielikums_Doktora_programmas_atbilstiba_augstskolu_likumam.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (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_3_Mapping_of_Doctoral_Study_Programme.pdf	3_pielikums_Doktora_studiju_programmas_kartejums.pdf
Curriculum of the study programme (for each type and form of the implementation of the study programme)	4_pielikums_Annex_4_Studiju_programmas_planojums_Planning_of_study_programme.pdf	4_pielikums_Annex_4_Studiju_programmas_planojums_Planning_of_study_programme.pdf
Descriptions of the study courses/ modules	Annex_5_description_of_study_courses.zip	5_pielikums_studiju_kursu_apraksti.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	Doktora_diploms_Doctor_diploma.zip	Doktora_diploms_Doctor_diploma.zip
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Vienosanas_ar_LLU_01000-4.1-e_53.zip	Vienosanas_ar_LLU_01000-4.1-e_53.zip
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	Par_zaudējumu_kompensāciju.edoc	Par_zaudējumu_kompensāciju.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.		
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.	02000-2.2.1-e_101 - LZP eksperti doktora programmā.edoc	02000-2.2.1-e_101 - LZP eksperti doktora programmā.edoc
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education	02000-2.2.1-e_94 - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc	02000-2.2.1-e_94 - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc
Sample (or samples) of the study agreement	Studiju_liguma_paraugs.zip	Studiju_liguma_paraugs.zip
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.	Nr_90_RTU_Dokt_tekstils_par_250_stud.edoc	Nr_90_RTU_Dokt_tekstils_par_250_stud.edoc

Material Technology and Design (42548)

Study field	*Manufacture and Processing*
ProcedureStudyProgram.Name	*Material Technology and Design*
Education classification code	*42548*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Silvija*
Surname of the study programme director	*Kukle*
E-mail of the study programme director	*silvija.kukle@rtu.lv*
Title of the study programme director	*Dr.habil.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*Provision of competitive professional higher education of 6th LQL/ 6th EQL and the fifth level and training of students for work in the field of design and technologies by specialising in development, design and materialisation of new materials, multifunctional, environmental items of a high aesthetic and ergonomic value, consumption products and their collection concepts.*
Tasks of the study programme	*- Educating professionals of the fifth qualification level in the field of product design enabling them to be competitive on the Latvian and also international labour market by working individually, in a team, planning and managing task forces, work of other contractors, companies;* *- Provision of comprehensive knowledge by providing broad interdisciplinary education in compliance with the education requirements of Latvia and European countries, creating good opportunities for innovation and research work in the area of design;* *- Developing a product designer's skills and competences in compliance with the profession standard "Product Designer" and the requirements defined by the labour market;* *- Promotion of the development of all levels of design education in Latvia by improving development and competitiveness of the Latvian national economy.*

Results of the study programme	*Graduates of the study program:* *– demonstrates broad-scale knowledge and comprehensive understanding of design processes and methods and is able to adapt it to use in unknown situations;* *– understands and is aware of the attained level of know-how in the profession, specialisation in the relevant and related science fields, performs critical analysis of knowledge;* *– is familiar with and understands the effects of the climate change and environment degradation, possibilities for restricting them and the designer's responsibility for ensuring sustainable circulation of resources, creation of sustainable living, work and social environment, planning of the environment and labour protection.* *– is able to develop concept solutions of products and/ or their collections according to users' needs, purchasing ability and the project/ market requirements, to visualise concept solutions in sketches, drawings, models/ samples by both traditional tools and in digital environments, and convincingly presents them by substantiated explanation of solutions to both clients and potential partners;* *– is able to use general application and specialised automated design systems of modern design technology, automated design and production control systems, software-controlled machinery in the product design process;* *– is able to plan, organise and perform product design works and schedule the time and material resources needed for them, as well as to participate in development of the technological documentation for industrially manufactured products;* *– is able to manage development of industrial product samples, to perform the author's supervision during the project implementation, to use the industry terminology, to comply with the industry standards, technical terms of reference and regulating documents, laws and regulations of the Republic of Latvia, as well as to assess the effect of regulation, commercial and environment restrictions upon processes and products;* *– is able to coordinate the work results with clients, cooperation partners and supervising institutions, to plan a product promotion campaign, to organise delivery of an order, to draft documents according to the requirements of laws and regulations;* *– is able to work individually, in a team, to schedule and manage own work, the work of a task force, other contractors, to comply with the principles of the professional and general ethics.* *– is able to analyse and predict fashion trends, methods, development trends of materials, technologies and products, to perform aesthetic, material technical, functional and economic analysis of products;* *– is able to plan, perform and lead materials compatibility, technologies, market and other necessary research, to analyse and evaluate their effect in mutually interlinked processes, to adopt decisions within the scope of competence and to assume responsibility for them;* *– is able independently structure own studies, to direct further education and professional improvement of oneself and subordinates, to apply the scientific approach in solving problems, to assume liability and initiative by performing work individually, within a team or managing the work of others, to adopt decisions and to find creative solutions in volatile or unclear circumstances;* *– is able to transform the acquired technical basis, skills and competences in creative professional, artistic, innovative or research activity, to define and describe analytically information, problems and solutions, to explain them and to discuss by providing relevant arguments with both professionals and the society.*
Final examination upon the completion of the study programme	*Bachelor Thesis with a design part*

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)	*General or vocational secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional bachelor degree in materials technology and design*
Qualification to be obtained (in english)	*Product designer*

Places of implementation

Place name	City	Address
Riga Technical University	RĪGA	KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050

III - DESCRIPTION OF THE STUDY PROGRAMME (1. Indicators Describing the Study Programme)

1.1. Description and analysis of changes in study programme parameters that have taken place since the issue of the previous accreditation certificate of study direction or the license of study programme if study programme is not included in the accreditation page of the study direction

In June 2013 the study building at Ķīpsalas Street 6 (previously at Āzenes Street 18) with modern equipment of classrooms and laboratories was commissioned allowing the specialities of the study program "Material technologies and design" scattered in various RTU buildings to return for continuing the study process at a single location, in the environment with appropriate infrastructure. Therefore, intense mastering of new resources and their incorporation in the study process took place, new methodologies and methodological materials were developed, the current ones were revised and adopted to the new environment in study year 2013/2014. Intense transition processes, approbation of methodologies and improvements continued in study years 2013/2014 and 2014/2015.

Along with opening of new opportunities, the number of credits in Section B of the study program was increased by reducing the number of credits in the "language" part of section B2 in 2013.

The practice of implementation of the study program and the survey of the work places of students, as well as information obtained from surveys of students and graduates indicated the necessity to develop and to incorporate in the study program new study courses targeted at integration of the specifics of industrially manufactured products and more intense mastering of design tools. In order to resolve the above issues, massive changes were introduced in the study program in academic year 2016/2017, by including four study courses developed and approbated during the preceding study year and accounting for 13 credits (hereinafter referred to as CP) in Section B1 and offering one study course of 2 CP in Section C. The study course "Upholstered Furniture Manufacturing" included in Section B1 deserves special attention as it allows mastering of the technology which is particularly important for furniture manufacturers in Latvia.

During this study year considerable changes were introduced in organisation of the internship by reducing the total internship volume from 26 CP to 20 CP and separating a part of the internship of 4 CP, which is included in the autumn and spring semester of the first study year and allows mastering practical basic knowledge and skills for starting more intense acquisition of specialisation study course in the third semester. This part of the internship was needed in particular by taking into account changes in the structure of applicants: during the preceding accreditation period a majority of students had vocational secondary education background, but during this period graduates of general secondary education institutions started accounting for an increasing majority of students. The main part of internship of 16 CP, which was transferred to the second semester of the third study year and the first semester of the fourth year, serves as good supplementation of the knowledge and skills mastered in the study process, prepares students for developing their Bachelor Thesis with a project part and makes it easier for students to join *Erasmus* program.

Due to the necessity to include a new study course of 6 CP in the Section A of the study program, changes in parts A, B1 and B2 were introduced in academic year 2016/2017: 1) by modifying the total number of CP of the parts, by including or moving study courses and 2) excluding courses

which overlap or are not viewed as practically applicable in the profession by students.

Taking into account development of the study program and the industry, as well as choices made by students, the title of the specialisation was updated by changing it from "Wood Design and Craftsmanship Technology" to "Wood Products and Interior Design and Technology".

In academic year 2017/2018, in compliance with the corrections of the study program made in the preceding academic year, changes were made in study plans by including the changes made in the study program, updating the split of study courses and internship by semesters, approbating the changes in the split and continuing improvement of the methodological provision of the new study courses.

Considerable changes were implemented in the study program in 2020 by closing the specialisation "Design and technology of leather items" because the demand from applicants to this study program had been very low over years (2-3 students or even none) and therefore it is not possible to provide this specialisation due to financial reasons. The low demand for this specialisation by employers is related to the fact that the development of the relevant sector of the national economy is weak in Latvia now and its focus is clearly crafts artistic. Of course, the situation in the sector may change, taking into account that the restrictions caused by Covid-19 pandemic bring gradual changes in the structure of the national economy. Still, the fact that considerable time is needed for restoration of the sector, forced to decide on closing this specialisation. Therefore, the study courses of the section B1 corresponding to the specialisation "Design and Technology of Leather Items" are excluded from the section B1 of the study program. Study courses which were obsolete, had not been demanded for an extended period of time or overlapped with current study courses were excluded from the sections B1 of the other specialisations.

Generally, it can be concluded that the changes incorporated in the study program within the limits of possibilities, are justified, aimed at improvement of the study process and its efficiency and have also allowed adapting to students' needs.

1.2. Analysis and assessment of the 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 in the different study forms, types, and languages.

The professional Bachelor study program "Material technology and design" is a full-time study program with specialisations in clothing design and technologies, textile design and technologies, wood products and interior design and technologies, and it is available in the Latvian language. During the report period, the number of students in the program has changed from 211 students in academic year 2013/2014 to 159 students in academic year 2019/2020. The number of students has decreased by 28% during the last two study years in comparison to academic year 2013/2014. The seen trend of reduction of the number of students can be explained by the demographic situation in Latvia and the increasing offer of opportunities to study in universities abroad.

Students use the study places financed from the state budget, and, in some cases when the budged funded places are filled, use private financing for a part of the study time until there are vacant budget funded places.

231 students have graduated from the study program "Material Technology and Design" during the time period from academic year 2013/2014 until 2019/2020. The changes in the number of

graduates are related to the number of students and its changes, the proportion of admitted students and graduates has not changed considerably and on average 59% of students have graduated from the study program.

There are various reasons for students dropping out, however, the following two biggest categories can be distinguished: expulsion because of failing study progress and expulsion based on the student's application. There is a mutual interaction between those two: if students are failing to achieve study progress, the ones who are more considerate apply for expulsion, and the ones who care less, just stop coming for classes, until they are expelled because of the failing progress. Of course, the above is not applicable to everybody within these two groups. There are also other reasons behind failing study progress: some students work full-time in parallel to their studies, an employer is not prepared to support studies, a student is engaged in job assignments of high responsibility (manages an undertaking, projects, performs orders) and considers that the desired status has been achieved, or cannot find time for studies because of the workload, family conditions change (new families are created, children need to be cared of, there are other priorities, loss of relatives, employment abroad). Some of expelled students continue studies after they have resolved their problems, there are several cases when students return after 5-10 years when they have a possibility to continue studying. Some students are not prepared to seriously focus on studying or discover that they cannot manage, don't like/ succeed at what has to be accomplished to have satisfactory study progress. In the other category there are students who have been expelled based on their application, in most cases students have been admitted to/ have started studying in several study programs at once and cannot combine them, or they want to suspend their studies due to work/ family circumstances, quite often also health deterioration serves as a reason thereof. Dropping out during the first study year is sometimes related to insufficient background knowledge or inability to complete particular study courses; the mathematics course causes particular problems to some of the students. In the fourth study year there are situations when students are expelled due to failing study progress prior to development of the Bachelor Thesis because there are several not passed study courses and a student understands that he/ she will not be able to develop the Bachelor Thesis with a project part in due time. The number of students expelled based on their applications has increased during academic year 2019/2020, which can be partially explained by the effect of Covid-19 crisis, which hindered the processes related to development of the Bachelor Thesis due to various reasons, including family circumstances and restrictions. At the same time, the number of awarded thesis which were submitted to the competition organised by the Latvian Association of Designers for schools and higher education institutions "Design Arena 2020" on several nomination has increased (eight, +1) (in Latvian: http://design.lv/lv/gada-balva-dizaina/skolu-un-augstskolu-kursa-dizaina-arena-2020-laureati).

The statistics data about students in the study program "Material technology and design during the period from academic year 2013/2014 to 2019/2020 are attached in Annex 5.

1.3. Analysis and assessment of the interrelation between the name of the study programme, the degree or professional qualification to be acquired or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements.

The goal of the study direction "Production and processing" is to provide competitive multilevel education based on scientific research to students in compliance with the requirements of the

Latvian and European labour market. The sub-goal of the direction is to develop, create and maintain sustainable education which is based on research and cooperation with the industry, production, processing and the national priority development areas.

The derived goal of the Bachelor study program "Material technology and design" is to provide competitive professional higher education of 6th LQL/ 6th EQL and the fifth level and training of students for work in the field of design and technologies by specialising in development, design and materialisation of new materials, multifunctional, environmental items of a high aesthetic and ergonomic value, consumption products and their collection concepts, to provide the possibilities for students to acquire theoretical and practical knowledge in the field of materials technologies and design compliant with the professional Bachelor degree and the national standard of the academic education.

The tasks of the study program are subordinated to attainment of the defined goal and aimed at achieving particular study results.

The tasks of the study program are to educate competitive specialists in the field of product design, who can work individually or in a team, planning and managing work groups, other executors, or managing a company, provide comprehensive knowledge by providing broad interdisciplinary education in compliance with the education requirements of Latvia and European countries, creating good opportunities for innovation and research work in the area of design, to develop product designer’s skills and competencies in accordance with the profession standard "Product Designer" and the requirements defined by the labour market, as well as to promote the development of all levels of design education in Latvia by improving development and competitiveness of the Latvian national economy.

The goals of the study courses included in the study program and the results to be achieved ensure the achievement of the overall goals and results of the study program, which is confirmed by the mapping of the study courses. In the study process, emphasis is placed on the acquisition of professional and practical competencies based on scientific achievements, theoretical knowledge and the specifics of the field.

As a result of studies (results to be attained) graduates of the study program:

- Demonstrates broad-scale knowledge and comprehensive understanding of design processes and methods and is able to adapt it to use in unknown situations;
- Understands and is aware of the attained level of know-how in the profession, specialisation in the relevant and related science fields, performs critical analysis of knowledge;
- Is familiar with and understands the effects of the climate change and environment degradation, possibilities for restricting them and the designer's responsibility for ensuring sustainable circulation of resources, creation of sustainable living, work and social environment, planning of the environment and labour protection.
- Is able to develop concept solutions of products and/ or their collections according to users' needs, purchasing ability and the project/ market requirements, to visualise concept solutions in sketches, drawings, models/ samples by both traditional tools and in digital environments, and convincingly presents them by substantiated explanation of solutions to both clients and potential partners;
- Is able to use general application and specialised automated design systems of modern design technology, automated design and production control systems, software-controlled machinery in the product design process;
- Is able to plan, organise and perform product design works and schedule the time and material resources needed for them, as well as to participate in development of the technological documentation for industrially manufactured products;

- Is able to manage development of industrial product samples, to perform the author's supervision during the project implementation, to use the industry terminology, to comply with the industry standards, technical terms of reference and regulating documents, laws and regulations of the Republic of Latvia, as well as to assess the effect of regulation, commercial and environment restrictions upon processes and products;
- Is able to coordinate the work results with clients, cooperation partners and supervising institutions, to plan a product promotion campaign, to organise delivery of an order, to draft documents according to the requirements of laws and regulations;
- Is able to work individually, in a team, to schedule and manage own work, the work of a task force, other contractors, to comply with the principles of the professional and general ethics.
- Is able to analyse and predict fashion trends, methods, development trends of materials, technologies and products, to perform aesthetic, material technical, functional and economic analysis of products;
- Is able to plan, perform and lead materials compatibility, technologies, market and other necessary research, to analyse and evaluate their effect in mutually interlinked processes, to adopt decisions within the scope of competence and to assume responsibility for them;
- Is able independently structure own studies, to direct further education and professional improvement of oneself and subordinates, to apply the scientific approach in solving problems, to assume liability and initiative by performing work individually, within a team or managing the work of others, to adopt decisions and to find creative solutions in volatile or unclear circumstances;
- Is able to transform the acquired technical basis, skills and competences in creative professional, artistic, innovative or research activity, to define and describe analytically information, problems and solutions, to explain them and to discuss by providing relevant arguments with both professionals and the society.

In order for applicants to be admitted to this study program, documents attesting completion of the general secondary education or vocational secondary education of 4 years need to be submitted. The Bachelor degree in materials technology and design and the qualification of a product designer is closely related to the tasks of the study program to provide interdisciplinary education which develops a professional's skills and competences in compliance with the requirements of the profession "Product designer" and the labour market to enable a graduate to work successfully as a member or a manager of a design group, and undertaking manager or an independent designer, and the title of the study program directly indicates the above.

The goal of the study program will only be attained if students achieve the above referred results in the study process. In order to select applicants possessing the abilities and skills needed for the profession, applicants need to pass an admission exam in drawing. As regards its content, the study program is developed in such a way as to ensure that the goals of its study courses and attainable results are subordinated and ensure achievement of the overall goal and results of the study program.

The professional Bachelor degree in materials technology and design and the qualification of a product designer is conferred following completion of the study courses of the study program and development of the Bachelor Thesis with a project part and its defence to the State Examination Commission. The analysis of the mutual link between the title of the study program, the degree to be conferred, the goal and objectives, study results and admission requirements leads to the conclusion that the link is logic and substantiated.

III - DESCRIPTION OF THE STUDY PROGRAMME (2. The Content of Studies and Implementation Thereof)

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In 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.

The analysis of conformity to Cabinet Regulations of the Republic of Latvia No. 512 "Regulations on the national standard of the second level professional higher education" approved on 26 August 2014 leads to the conclusion that the professional Bachelor study program "Material technology and design" conforms to the requirements defined by the national standard. Assessment of conformity to the standard is attached in Annex 6.

Taking into account that, upon graduation from the study program, the professional qualification "Product designer" is conferred along with the Bachelor degree, the study program has also been coordinated with the standard of the relevant profession "Product designer" (profession code 2166 03). Annex 7 presents the comparison between the study program and the requirements of the profession standard. The conformity of the qualification acquired in the study program attests this conformity.

Considering that in the study process and in preparation of the graduation papers students work with various devices and tools, particular attention is focused on the labour safety.

The content of the study program is continuously renovated and improved according to the recent trends in the sector of light industry and wood industry, the area of product design, the national economy and regional development, considering the situation and requirements on the labour market. In order to ensure that the program maintains its topicality, smaller or bigger changes are continuously introduced there by replacing current study courses or supplementing the study program with new topical study courses. Changes are proposed and discussed at the Department of Design and Materials Technologies, approved by the Committee of the study direction "Production and Processing"and submitted for approval to the Council of the Faculty of Materials Sciences and Applied Chemistry, attested by the Study Department of RTU and approved with decisions of the RTU Senate. Changes implemented in the study program from 2013 to 2020 are attached in the Report on the implementation of recommendations.

The academic staff consider topical issues in production and processing companies, development of cities and regions in implementation of their study courses, they often participate in their solution within projects. Particular attention is focused on the issues of the represented area in Latvia and these are reflected in the content and classes of study courses. Also students participate in improvement of the study content by filling in surveys and evaluating the content of the study courses completed during the relevant semester, availability of study materials and the quality of their implementation. Students also have an opportunity to contact the responsible academic staff member, the director of the study program, the head of the department or the institute to present suggestions for improvements in the study process. During recent years students are participating

in organisation of study processes more actively - the management of the department and the institute receive applications for extending the terms of submission of assignments, which can be explained by development of large-scope practical assignments now hindered by safety measures related to Covid-19, delays of delivery of materials at undertakings.

The opinion of graduates and employers plays an important role in improvement of the content of the study program. Cooperation is particularly close with professional associations, research centres in Latvia and abroad and also local governments. Several lecturers are employed at / own architecture/ interior/ furniture design offices or their management boards, work as stylists, designers, constructors, clothing designers, teachers are technical school, design and art education institutions in parallel to their work at RTU and this provides extra contribution to both entities and links between them, including by involving students in joint activities. The list of cooperation agreements is attached in Annex 9 of the Study Field - List of the cooperation agreement.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In 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.

As regards its structure and content, the professional Bachelor study program "Material Technology and Design" is targeted to attaining its goal which is closely related to the defined attainable study results of the study program. They can be attained within the process of completing study courses, therefore the goals defined by descriptions of the content of study courses are closely related with the joint attainable results of the study program, and study courses are mutually related and supplement each other to ensure that envisaged results are achieved following completion of the study program. The link between study courses and the study results of the study program is reflected by the mapping of the study courses, which is attached in Annex 8. A certain sequence is followed in planning implementation of study courses for successful attaining of the study program results. The plan of the study program is attached in Annex No. 9. Descriptions of study courses are collected in the uniform RTU Register of Study Courses. Descriptions of study courses included in the professional Bachelor study program "Materials technologies and design" are attached in Annex 10, containing descriptions of **23 compulsory study courses**, including the following: descriptions of Part A.1. general education study courses (5), Part A.2 of field specific theoretical basic study courses and information technology courses (12) and Part A.3 of the field specific professional study courses, descriptions of **48 restricted choice study courses**, including Part B.1 of professional specialisation courses (39), Part B.2 of humanities and social sciences study courses (6) and Part B.6 of the language study courses (3), as well as descriptions of Part D internship (practical placement) (1) and descriptions of the final/ state exams of Part E (1).

2.3. Assessment of the study implementation methods (including the evaluation methods) by providing the analysis of how the study implementation methods (including the evaluation methods) used in the study courses/ modules are selected, what they are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. Provide an explanation of how the student-centred

principles are taken into account in the implementation of the study process.

The study process is organised in the form of lectures, laboratory assignments and practical assignments. The selection of the methods of implementation of the study program and study courses has been targeted at achieving the set goals and results, by approving them on the level of the Department of Design and Materials Technologies, the management of the study program and involved academic staff.

As a result, the organisation of the study process provides acquisition of comprehensive theoretical and practical knowledge, skills and abilities to students by including use of extensive and varied training forms within study courses and topics to be acquired. The following is applied for acquiring and strengthening the knowledge of the content of study courses: lectures, demonstrations, seminars, practical assignments, presentations, discussions, case analysis, group work. Assignments of varied degree of difficulty are offered according to the background level of students.

Considering specifics of the branch, integration of the design thinking methods and tools in the process of implementation of study courses is encouraged, as well as guest lectures and students' study trips to undertakings of the branch providing additional knowledge to students, links with the work environment of technologies and design, its inter-disciplinary nature, requirements and processes.

Focus is on the teaching style "teaching to study", within the framework of which students undertake and organise their studies, plan their time, practice invidual and group research for the purpose of acquiring knowledge, developing creative abilities and promoting interest about the processes in the science and society by analysing and comparing statistics data, the specifics of the target audience, design trends, products and their replacements, by performing the survey of the product/ service market, etc. Within the framework of research projects, students also work on matters of adaptation of new materials, functionality, aesthetics, ergonomics, design, technology, production and other aspects to design solutions, by applying the mastered visualisation skills in the material, rastre and vectorgraphics software in the process. Acquired knowledge about materials, their properties, selection of designs according to technological processing possibilities and optimum use of labour and time are linked with the calculations of the product unit costs and the lowest price. Considering the market and fashion trends, the core principles of form creation, aesthetics and artistic innovation are integrated in design, products are adapted to the requirements of ergonomics, standards and safety. Group work is implemented by applying the interactive method, by encouraging cooperation and interaction on two levels: a professor-student and a student-student. Within this framework, students apply the theoretical knowledge and the knowledge acquired by solving type assignments by integrating them in solutions of development, design or production challenges. Within the group work process, work stages are planned, cooperation is developed between the group members, communication skills are developed. Students are directed towards attaining individual and group goals, independence, increase of responsibility and mutual respect, as well as analysis of the results achieved by joint action, their preparation and encouragement of presentation. The method of business games is also applied in implementation of study courses, by developing various skills, including the skills of independent thinking and assessment, communication and presentation, as well as the ability to respect the opinion of course mates. The method of role and simulation games is also used for learning particular topics, thus encouraging involvement of students in the study process, by promoting creativity, studying of the related environment, solution and assessment of conflicts. In role games

students take roles of a customer, a potential buyer or user of a product, as well as roles of a member of a design group, a manager and an independent designer, which allows solving various cases, creating and developing a professional's skills and competences according to the profession standard, improving understanding of empathy, which is important in processes of development or improvement of competitive products.

Upon starting studies, the interest of the research work is encouraged and students' competences in this area are developed. Students participate in the subsection "Design Technologies" of the Institute of Design Technologies of the annual Scientific Conference of RTU Students. Students' skills of working with data bases (*Scopus*; the data base of the Latvian standards; *SpringerLink*; *ScienceDirect*), selecting necessary information and analysing scientific articles are developed, students' skills of processing of statistics data are strengthened. Students develop a study paper (a study project) within several study courses by linking it with the knowledge, skills, abilities acquired and study papers/ projects developed in other study courses, as well as the methods of implementation of a study course applied therein. Within the above framework, students carry out topical research, analysis, comparison, necessary calculations, define challenges, ideas and develop conceptual solutions, simulate and visualise them, prepare sketches, test and analyse obtained results, define conclusions, develop improvements and carry out self-assessment. The outcome is prepared in the form of a research work, project, portfolio or presentation and reported to the group. Students integrate knowledge about planning of design, technology and business in their study papers/ projects by transforming design ideas in the offers of competitive products. The study process results in preparing students for practical work in the field of technologies and design, they successfully participate in competitions and exhibitions, mainly in the fields of products, clothing, interior design, develop actual design projects, develop and design consumer products/ collections and implement them.

Both quality and quantity methods are applied for assessment of results: discussions, seminars, presentations, tests, assignments, practical assignments, laboratory assignments and examinations. Assessment methods have been selected based on the attainable goals and results of the study process and the study course, by linking them with the methods applied for implementation of studies and the specifics of the topics to be acquired. They are used for getting information about the progress during the semester, strengthening knowledge and skills, promoting systematic work and responsibility, adjusting and improving the study process, obtaining feedback and involving students in assessment. Students are given an opportunity to submit prepared works on the RTU portal ORTUS in due time to prevent a situation when assessment cannot be received due to valid causes because of non-arrival.

The cumulative assessment system is applied for the final assessment of study courses, where the final grade consists of several components. The outcome takes into account both a student's work during the semester by assigning it a certain weight in the final grade, for instance, tests, reports, presentations and other works completed during the semester, and the examination assessment, the value of which does not exceed 50% of the final grade according to the resolution of the Senate of RTU (Resolution of the Senate of RTU No. 610 "On approval of the regulations of assessment of study results in a new version", adopted on 29.05.2017). According to this condition, the academic staff independently develops the structure of assessment of a study course within their relevant study courses.

Students can make use of consultations of the academic staff in the minimum volume of two academic lessons per week, and students have an opportunity to communicate with the academic staff there and receive answers to questions they are interested in. It is also possible to send individual questions to the academic staff or to post them in the shared document anonymously, thus allowing also more introvert students to participate. Such questions may be answered not only

by the professor, but also other students, thus strengthening their knowledge. This allows the academic staff to help students to prepare for a test or to strengthen knowledge in due time and in a comprehensive manner, and it also allows identifying the aspects which need to be focused on by implementing the relevant study courses during next periods.

The results of assessment of the knowledge of the students of the professional Bachelor program “Material Technology and Design” are discussed at the meetings of the Department of Design and Materials Technologies twice a year. Results are summarised and assessed also by the administration of the study program. Along with the results of student surveys they serve as the basis for further improvement of the study process.

The analysis of the methods of implementation of study courses and assessment of results applied in the study program allows concluding that the principles of student-focused education are followed:

- the diversity of students and their needs is taken into account and respected by creating appropriate ways of learning;
- according to students' abilities and needs, the academic staff applies diverse teaching methods and encourage a student's willingness to be independent, at the same time providing the leadership and support by the academic staff;
- the process of a study course promotes mutual respect in the relationship of students and the academic staff because the principle of democracy is followed and the administration of the study program takes into account the students' opinion as far as possible.

The organisation and quality of the students' assessment system is very important in implementation of student-focused education. The analysis and assessment of this system within the study program leads to the conclusion that:

- the assessment methods and criteria for deciding on grades are published in advance on RTU portal ORTUS, the academic staff presents them to students upon starting a study course and students are well aware of these conditions in advance;
- assessment is consistent, fair, suitable for all students and is implemented in compliance with approved procedures;
- assessment reflects achieved study results and students have an opportunity to receive feedback;
- the academic staff continuously improves their teaching skills at academic conferences and seminars in order to improve the teaching methods and assessment of the results of study courses.

2.4. If the study programme entails a traineeship, provide the analysis and assessment of the relation between the tasks of the traineeship included in the study programme and the learning outcomes of the study programme. Specify how the higher education institution/ college supports the students within the study programme regarding the fulfilment of the tasks set for students during the traineeship.

In compliance with Cabinet Regulations of the Republic of Latvia No. 512 "Regulations on the national standard of the second level professional higher education" approved on 26 August 2014, internship of 20 CP is provided within the professional Bachelor program. Until 1 July 2019 the study internship was implemented in compliance with the regulations approved by the Senate of RTU on

29 March 2010 (Resolution of the Senate of RTU "On regulations on assessment of study results" (Minutes No.539)), and from the autumn semester of 2019 it is done in compliance with the Resolution of the Senate of RTU of 28 January 2019 (Minutes No. .626) „On approval of the new version of the procedure of organisation of internship in Riga Technical University". Internship is implemented in compliance with the regulations and methodology guidelines developed and approved by the Department of Design and Materials Technologies, which is the structural unit implementing the study program "Material Technologies and Design". Internship description MVR721 has been developed based on these documents and it is available in the RTU Register of Study Courses. Both documents define the goals, objectives and attainable results of the internship which are linked to the goal of the study program and the results to be attained in the study process.

The internship of 20 CP to be implemented in the study program "Material Technologies and Design" is split in 2 parts.

The internship of 4 CP during the first study year takes place in the laboratories of the Department of Design and Materials Technologies (hereinafter referred to as DDMT) and as study trips to undertakings operating in the industry. This part of internship is supervised by the study personnel assigned by the head of DDMT. Within the framework of the internship, supervised by highly qualified academic staff, students perform practical assignments by mastering the possibilities of use of materials and tools, safe working methods, basic skills of production of products, as well as familiarise themselves with the leading industry events and undertakings by visiting them. The internship assessment is based on the work performed by students, prepared interim reports and the assessment of the demonstration of every 6 months assessed by several academic staff members. Works are assessed based on the defined criteria which are presented to students at the first internship class.

The other part of internship of 16 CP takes place at the industry undertakings or master workshops supervised by the internship supervisor. In the course of organisation of this internship, the head of the structural unit appoints and the Dean of the Faculty of Applied Chemistry approves by an order one or several internship coordinators. Internship is individually supervised for every student by the internship coordinator or the internship supervisor. The structural unit provides/ approves a place of internship in compliance with the program requirements within the implementation of the internship. If a student selects a place for internship independently, it needs to be approved by the internship coordinator. The structural unit, the place of internship and the student sign a tripartite agreement providing for all the obligations, rights and responsibility of the parties. If an agreement is signed by a foreign place of internship or a foreign student, the tripartite agreement in English and Latvian is signed. Assignment of a student to internship is done by an order of the head of the structural unit in the studies management system. In addition to the list in the methodological guidelines on internship, a student receives an individual internship assignment from the internship coordinator before starting the internship. Considering the diversity of undertakings and the inter-disciplinary nature of the design field, students both apply the knowledge and skills acquired in the study process in their internship and also master new ones, as well as gain in-depth understanding and get acquainted with the work environment, organisation and technologies of an undertaking of the relevant specialisation.

Considering the complicated, multi-functional specifics of the design and production of clothing collections, and product promotion, the internship of the students of the specialisation "Clothing Design and Technologies" takes place at the Fashion Design Mater Worksop of a highly qualified professional fashion designer by additionally involving highly qualified clothing technology professionals, a collection manager, fashion agencies, choreographers, by jointly performing the complete cycle starting from the market research, development of the collection design sketches to

preparation of the collection for presenting it and public demonstration at a fashion show and in media. The annual student fashion shows “Ķīpsala Spring” (RTU Fashion Show since 2020) take place every year at the end of April and attract an audience of approximately 1000 people in two sessions, including senior level students and the academic staff of vocational programs and secondary education institutions. Thus, students go through all the stages of developing and presenting a collection in practice, attract a range of sponsors providing make-up, hairstyling, footwear, models, twice during their studies, i.e. in the third study year (minimum 5 garments) and in the fourth study year (minimum 7 garments).The graphic design package (see Annex 2.4.1) is developed in parallel, and this is done by the graduated of the preceding year within the framework of their Master studies.

At the completion of the internship, a student submits an internship report to the internship coordinator, which is prepared in compliance with the requirements defined by the methodological guidelines of internship and the individual internship assignment.

The internship supervisor receives electronically an access link to the review form from the study management system seven days before the conclusion of the internship. The internship supervisor prepares a review on the student's work during the internship online and the student has access to it in RTU ORTUSS e-study environment, and the internship coordinator has access to it in the study management system.

The defence of internship is public. The Head of the Department approves the internship assessment commission consisting of minimum two members. The representatives of the academic staff of the structural unit are included in the commission, in some cases representatives of the industry professional associations or employers are involved, however, the majority of the representatives of the structural unit is maintained. The commission assessed a student's internship performance according to the scale of 10 points, taking into account the assessment of the internship report by the internship coordinator according to the scale of 10 points and the assessment by the internship supervisor according to the requirements set by the structural unit and included in the methodological guidelines of internship. Internship reports are stored at the structural unit until the student's graduation.

During the time period from the autumn semester of academic year 2013 until the autumn semester of academic year 2020, students have had internships/ visited more than 150 various undertakings, for instance, “Daiļrade Koks” Ltd, “Kampenuss Furniture” Ltd, “Rīgas Krēslu Fabrika” Ltd, “Krassky” Ltd, “AM Furnitūra” Ltd, “Latvijas Finieris” AS, “Trentini” Ltd, “KATE” Ltd, “H2E” Ltd, “MARKS M” Ltd, “KVIST” Ltd, “Rīgas Interjeri” Ltd, “Skaidras Deksnes modes dizaina meistardarbnīca” IK, “Volume” Ltd, “Gaļina Terļecka” IK, “ZIBtekstils” Ltd, “Solution” Ltd, “CeWood” Ltd. Students gain skills in the field of design and production of products/ collections of environment items at undertakings. Considering the diversity of undertakings and the variety of the design field, students both apply the skills acquired in the study program in their internship and also master new ones, as well as gain in-depth understanding and get acquainted with the work environment, tools and technologies of an undertaking of the relevant specialisation.

Assessments of the internship works are overall positive, mostly assessed with grades 7 (good) to 10 (outstanding). The conclusions of the internship supervisors and employers regarding students' knowledge and work: students are focused, diligently perform internship assignments, some students stand out with their ability to introduce innovative solutions in identification and prevention of an undertaking issues, can join in the work of the undertaking team and separate work groups fast, perform their duties with high feeling of responsibility, attest the skill to apply acquired knowledge in the actual work environment, complete assigned tasks within the set terms, are not afraid of new challenges, students have good computer and common software skills.

Knowledge of some students has been assessed as satisfactory, still their attitude to assigned duties and willingness to improve in the profession they have chosen has received positive assessment.

Irrespective of the variety of the selected places of internship, during the internship students perform tasks and research related to the specifics of the study program, familiarise with/ participate at processes important for a designer's practice. Taking into account that the second part of internship starts in the spring semester of the third study year, a majority of students has attained sufficient level of skills for performing functions in a project group, provide consultations at design salons and other work places. In some cases speed is missing in operating design software, however, according to some internship supervisors, the students are doing better than interns from other educational institutions. Some undertakings and organisations approach DDMT and offer places for internship, hoping to attract students to work in their undertakings in this way.

2.5. 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 evaluations of the final theses.

Development and defence of the Bachelor thesis allows assessing attainment and the goal of the study program and envisaged results during the study process. Therefore, during this stage of studies, a student needs to apply the complete set of knowledge, skills and competences acquired during studies in the study program.

The graduation paper of the study program "Material Technologies and Design", i.e. the Bachelor thesis with a project part covers all the stages of production of a product/ collection, starting with research of the market, fashion trends, materials, offered products and designs, transforming into the procedures of development and testing of an idea, followed by the development of designs and structural nodes, selection of materials and technologies, implementation in the material (pre-production samples) and also analysis of the economic aspects of the project.

An important part of development of thesis consists of research activities, starting from research on the demand/ offer, prices, competitors, promotion possibilities of the product/ services, fashion trends, attitudes of potential clients, by including investigation of various target audiences from the point of view of age, needs, interests, financial condition, analysis and design of the design solutions of the product, application of materials and their properties, which is needed for successful generation of the idea. In further research it is found out how aesthetic, functional, ergonomic, structural and technological properties can be combined in a competitive product and how a successful product promotion program can be developed. Within this process, a student collects, analyses recent relevant information on all types of topical issues and processes in the industry needed for selecting a topic and develops the basis for solving it. Research is continued during the whole course of development of the thesis by supplementing/ updating the relevant data for the issue to be solved.

A formal scheme-regulations, containing the description of sections to be completed, compliant with the specialisation has been developed for planning and supervising the process of development of the Bachelor thesis. The issue for the Bachelor thesis is selected by a student in cooperation with the leading academic staff of the specialisation, the head of the study program and the academic staff of the specialisation study courses in compliance with the goals, objectives, of the study program, specialisation, and own interests and possibilities. The research of the

selected issue and its possible solutions are developed, presented and discussed at several interim demonstrations, until they are approved for further processing. At the discussions of interim demonstrations, opinions are expressed also by students along with the academic staff.

On the basis of the topicality of the defined design issue and its compliance with the industry specifics and the selected specialisation, functional and sustainable products suitable for the relevant environment and target audience, which create improvements and innovations in materials, structures, technologies, use, functionality and ergonomics, are developed in the Bachelor thesis.

The summary of the topics of the Bachelor thesis during the time period from 2013 to 2020 are attached in Annex 2.5.1.

The topics investigated and developed and different products and design solutions produced by Bachelor thesis within the specialisation "Wood Products and Interior Design and Technologies" include the following:

- products for children (furniture, toys, developing products),
- furniture (for indoor and outdoor use, folding, modular, also specialised, for instance, for therapy or improvement of ergonomics, also exclusive furniture),
- educating products (both for specific training, and for educating the society),
- decorative items and accessories,
- sports inventory (including for dancing),
- products for animals,
- socially responsible products (housing for seals, for persons with vision impairment, for persons after infarction, for reducing UDHS),
- research and materials science works (creation of new materials and their introduction in products),
- solutions for upgrading of technologies (use of new structural elements or materials in products),
- environment items (wood supports),
- music instruments or accessories for their maintenance (electrical acoustic guitar, CNC device for production of bassoon claps),
- equipment for improving the work environment (cable organisers, panels splitting a room and elements for organisation of a work place).

Bachelor thesis of the specialisation "Clothing Design and Technologies" are garment collections. They are developed according the to the forecast of the global colour scheme, fashion trends, topicalities and themes. A common theme is defined every year and students develop their collections within this theme. The field of the clothing design is clearly subject to the seasonal nature, social economic developments and changes in topical issues. Within the framework of the theme, a student defines and visualises his or her idea based on trends and topicalities, in particular, a collection and the design of each individual garment where all the elements are mutually coordinated and substantiated.

According to the selected theme, a supervisor and also a co-supervisor and/ or adviser, when necessary, is assigned, also advisers on chapters are involved within the process of development thereof. The academic staff and supervisors ensure that it would be possible to find sufficient scope of information in the relevant study courses, methodological materials and recommended sources for successful solution. During performance of the work, consultations of the supervisor and the

academic staff in charge of relevant chapters of the thesis are available to a student, if necessary. The correctness of a solution reflected in a chapter is approved by the chapter adviser by signing the cover page of the thesis. The schedule of development of the Bachelor thesis is checked by the commission compliant with the specialisation minimum three times at various stages of completion, by assessing the readiness of the work stages, changing/ supplementing the direction of the work, recommending additional consultations, if required.

State Qualification Commissions led by professionals of the relevant field are created for assessment of the Bachelor thesis with a project part. 50% of the Commission composition are professionals of the relevant field external to the higher education institutions, and 50% are the members of the academic staff of study courses. The commission performs complex assessment of both the descriptive part of the thesis, the conformity of the properties of use of the product/ collection produced in material, and also presentation of the work on scene at RTU Fashion Show or in the exposition of the trade fair "Design Code". The graphic design packages for both the fashion show and the trade fair "Design Code" (attached in Annex 2.4.1), the plan of the exposition/ arrangement and arrangements are performed by the graduates of the preceding year within their Master studies. As Covid-19 restrictions did not allow organising the fashion show and the exhibition of design products as a public event in 2020, new solutions were searched. Collections were developed according to the usual procedure, the show was prepared in a digital video format *https://www.youtube.com/watch?v=eLVl41EMXl4*, and the State Examination Commission analysed the collections produced in material during the defence procedure. Digital cards were prepared for design products and published on facebook.com account of the Institute of Design Technologies (@KipsalasDizainaKods), as well as on the website of RTU in Latvian: *https://www.rtu.lv/lv/universitate/masu-medijiem/zinas/atvert/izstade-kipsalas-dizaina-kods-bus-aplukojama-interneta*. Works in material were assessed at the Institute of Design Technologies without students being present.

Within the procedure of defence of the Bachelor thesis, the applicant for the professional Bachelor degree has to prove that he/she has acquired knowledge on properties of materials, is prepared to carry out research for identification of the quality and conformity of materials, has mastered skills to prepare materials for processing, has learned everything necessary for founding and managing own undertaking, creating small-scale and industrial collections, working at design studios and opening own design studios, workshops, master workshops, working as design advisers, as well as in the area of advertising. By defending the Bachelor thesis, it is necessary to demonstrate the scope of this knowledge and skills, the innovation potential, the skills to perform necessary research and to transform obtained results into a competitive product, in reduction of consumption of materials, labour and other resources, to assess the developed product/ collection from the point of view of various aspects and to listen to assessments by professionals of related sectors.

The assessment of the Bachelor thesis with a project part takes into account the substantiation of the issue, the original nature of the solution, the artistic aesthetic, functional, ergonomic, economic quality and the quality of appropriate selection of materials, structure and technology, as well as the ability to present and to analyse the work progress and achieved results. Products/ collections implemented in material are presented at exhibitions and fashion shows within the framework of developing the thesis at RTU, by demonstrating them to a broader audience prior to defence of the Bachelor thesis and receiving feedback which is important for authors, co-authors and personnel in further developing of the professional capacity. The members of the State Examination Commission include also this aspect in their assessment and it can be seen on the assessment record sheets.

Thus, the process of development of the Bachelor thesis with a project part, developed Bachelor thesis and their assessment system reflect their direct link with the results attainable in the study program, the profession standard and the diverse aspects of the profession of a product designer.

Many authors with products/collections developed in the framework of the bachelor's work take part in exhibitions (e.g. the MINOX 2014 exhibition of inventions and innovations, an international exhibition at KIND + JUGEND 2019 (Germany), take part in fashion shows outside the university (DIZAINO DIENAS at Kaunas University of Technology (Lithuania)), in competitions (e.g. the Latvian Designers' Society AWARD FOR DESIGN 2017 and the competition DESIGN ARENA 2018, 2019, 2020, International Young Designers Contest MERINGUE (fashion contest 2019), KIDS DESIGN AWARD 2019 (Germany), the young fashion designer competition FASHION MANIFESTATION 2020), are rewarded and displayed in various media.

Many works completed in the study process and at its completion form a designer's portfolio, which is a valuable gain upon joining the local or global labour market or starting own business.

Defended Bachelor thesis and their topics based on solution of topical issues according to the student's specialisation attest the importance and topicality of performed research and developed products/ collections for both the national economy as a whole and individual undertakings and sectors, as well as the labour market and a graduate on it. This is also confirmed by development of cooperation between the future product designer and a sector undertaking where the graduation paper is developed within the cooperation process. Graduation papers serve also as the basis for creation of new brands and start-ups. For example, the Bachelor thesis of the graduate of the specialisation of "Wood Design and Craftsmanship Technology" of academic year 2013/14 Kitija Gaile served as the basis for creating the brand MATERIABIKES (https://materiabikes.com/) for production of exclusive wood bicycle frames. Bicycles are sold on both European and American markets.

The mean assessment of graduation papers from academic year 2013 to 2020 has been 7.92. During the eight academic years under review, 25 students' qualification papers have received the highest grade 10 (outstanding) (see Annex 2.5.1).

2.6. Analysis and assessment of the outcomes of the surveys conducted among the students, graduates, and employers, and the use of these outcomes for the improvement of the content and quality of studies by providing the respective examples.

In order to obtain feedback, regular electronic surveys of students regarding the study content and the quality of work of the academic staff are performed. The system of monitoring and provision of the study quality introduced in RTU provides for a possibility to carry out surveys on the RTU portal ORTUS . Questionnaires are submitted anonymously. At the end of every semester, the survey of students is performed regarding all the study courses and the survey of graduates regarding the study program as a whole is performed at the end of every study year. Every member of the academic staff can see the students' answers regarding the study course and assess them to improve the study course, as well as to add questions to the questionnaires to receive more accurate information. The directors of study programs have access to the assessments of all the study courses and the graduates' answers.

2.6.1. Students' surveys

For the purpose of establishing students' view regarding the study program "Material Technologies and Design", a survey was performed during the time period from 16.09.2020 to 04.10.2020. Questionnaires were submitted by 43 students: 15 of the 2nd year (35 %), 15 of the 3rd year (35 %)

and 13 of the 4th year (30 %).

56 % of the respondents have answered that they are fully or partially satisfied with the selected study program, moreover, in the 2nd year 67 % are fully satisfied, in the 3rd year 53 % have expressed neutral assessment and in the 4th year 54 % are partially or fully satisfied. 54 % are partially or fully satisfied with the theoretic knowledge and 60 % with practical skills. 65 % of the students are partially or fully satisfied with the ratio of lectures and practical classes.

55 % state that they are partially or fully satisfied with the schedule of lectures, however, the level of satisfaction decreases every next study year (73 % in the 2nd study year, 53 % in the 3rd study year and 38 % in the 4th study year), which can be explained by limited possibilities to schedule full days in the schedule of lectures and sometimes classes had to be attended at times which are hard to combine with employment (in the extended answers, a student of the 2nd year suggests not to have 1-2 lectures at lunch time every day, it would be better to have some days longer and other days free).

Students appreciate the premises where classes take place (33 % are partially satisfied and 45% are fully satisfied, and 83 % are partially or fully satisfied with the provision of teaching aids in classrooms (an overhead projector, a whiteboard, etc.).

93 % of the 2nd year students are satisfied with availability of the study literature needed for acquisition of the study program, in the 3rd year this proportion is only 40 % and in the 4th year it is 62 %. It should be assessed what literature sources are missed by the 3rd year students by performing in-depth survey and analysis of the provision of literature. It follows from the received survey results that 35 % of the students admit that study materials are available in the e-study environment, 59 % state that they are partially available and 20 % indicate that they are not available. The insufficient availability of study materials in the e-environment can be explained by the effect caused by the timing of the survey, in the beginning of the semester not all the academic staff had managed to publish their materials in RTU ORTUS environment.

The student's assessment of the international cooperation of the higher education institution is positive, 84 % assess positively the international student exchange and 55 % state that the number of foreign guest lecturers is sufficient.

Answers to the question "How would you generally describe the time spent at RTU?" are varied. Although students spend most of their time by acquiring the study program, the general impression is created also by out-of-studies activities, motivation and goals of students. The survey results reveal a clear trend that this assessment is deteriorating, as the time devoted to studies increases; 73 % have provided the assessment good and very good in the 2nd study year, and in the 4th study year there are only 30 % such answers.

55 % of the respondents give positive assessment to the infrastructure of RTU and only 26% give negative assessment to it. Students could also submit recommendations regarding the necessary improvements in the study program by providing free answers:

- 18% consider that no improvements are needed or don't have particular recommendations;
- 10% suggest increasing the level of the English language teaching and making the mathematics course easier, improving the qualification and motivation of the academic staff;
- 15% would like to have more study courses related to the interior design, to revise the sequence of acquisition of study courses;
- 15% suggest removing mathematics from the study program all together.

The summary of students' questionnaires leads to the conclusion that students are generally satisfied with the study program. Students experience most problems with the mathematics course

which cannot be removed from the program.

The summary of students' survey data is attached in Annex 2.6.1.

2.6.2. Graduates' surveys

RTU holds regular annual surveys to find out the opinions of graduates. During the accreditation period from June 2014 to June 2020, questionnaires were filled in by 135 graduates of the study program "Material Technologies and Design" out of the total number of 231, i.e. 58 %. Over years the ratio of filled in questionnaires ranges from 42 % to 77 %.

The summary of graduates' survey data is attached in Annex 2.6.2.

Over a period of seven academic years, on average 73 % of graduates state that they are satisfied (partially or fully) with the choice to study at RTU and 66 % are satisfied with their choice to study in the program "Materials Technology and Design". 63 % of graduates consider that they are satisfied with the theoretical knowledge they have acquired and 55 % are satisfied with practical skills, 19 % and 21 % of the respondents have expressed neutral assessment accordingly. The ratio of lectures and practical classes has been considered optimum in 53 % of questionnaires and neutral opinion has been expressed in 21 % of questionnaires. Totally only 43 % of graduates have been satisfied with the planning of classes, the opinion is neutral in 18 %. As regards the planning, the situation has changed a lot in the opinion of the graduates of 2018 and further academic years: 67 % of graduates were satisfied and 24% expressed a neutral opinion in academic year 2017, and in the survey of academic year 2018 the proportion of satisfied graduates has decreased to 24 %, in the survey of academic year 2019 it has increased to 25 % and has further increased up to 31 % in academic year 2020, the proportion of neutral opinions has also increased to 25 %, thus giving a hope that the situation is gradually improving. This sharp deterioration should be related to radical changes in the administration personnel and relevant processes resulting in assigning the shared use status to a part of the study rooms and the computer class of the structural unit, thus restricting the planning options within the structural unit.

82 % and 90 % of graduates accordingly are satisfied with the provision of classrooms and teaching aids of classrooms, the study literature needed for acquiring the study program has been available to 73 % and 12 % have a neutral opinion on this matter. 82 % have agreed to the statement that most of the academic staff had provided study materials in the e-study environment, and 73 % consider that all the necessary information for the study process was always easily available, 15 % had a neutral opinion. 47 % of graduates would recommend this study program to future potential students, 23 % have expressed a neutral opinion and 4 % have not submitted their assessment.

Within the surveys, graduates have expressed their attitude to the time spent for studies and have provided a range of recommendations for improving the study program in their extended answers. A majority of graduates has provided positive assessment for the time they have spent for studies: *a lot needs to be done, but it was good, *have felt at home, *the time was attractive, positive, *a creative period, *practical assignments, mastering of equipment, should be assessed as positive, *a lot of knowledge and great experience acquired, *happy for the obtained knowledge, *great experience. Other state: *I generally liked, however, communication with the academic staff during development of the Bachelor thesis could be faster, in particular during the *Covid-19* crisis; *lecture materials were sometimes posted on RTU *Ortus* just before the next lecture. For some others this *has seemed a difficult and complicated time, a lot had to be done during the last study years, hard to combine with working, or *quite labour-intense and stressful. Many experience difficulties in combining studies and work, because, as surveys indicate, 50 % to 64 % of students work, in recent years up to 80% of the respondents have worked 1/2 time or full time according to the ratio 60:40,

and it is difficult to combine this during development of the Bachelor thesis. Unfortunately, the administration of the study program does not have financial resources which could help to solve this type of problems.

Recommended improvements which are seen more often:

1. the split of study courses per semesters, by emphasising that provision of specialisation courses should be stared during the first study years. This problem can be solved only partially. The introduced internship of 4 CP during the first study year for mastering the basic skills of the specialisation is one of the implemented solutions. The split of study courses per semesters is changes as far as possible, however, the sequence of study courses of Part A and specialisation profile courses is logic and needs to be coordinated with the defined number of credit points per semester and a range of other restrictions, including the ones defined by the education legislation and resolutions of the Senate of RTU, which need to taken into account and make the system generally little flexible;
2. in the specialisation of clothing design and technologies it is desirable to have internship not only in master workshops, but also in the sector undertakings. This solution has been considered by providing inclusion internship for this specialisation in the summer semester following the *Covid-19* crisis; this is not possible during the crisis because of various restrictions and the response of undertakings;
3. too few courses related to the interior design. In response to the above, study courses of Part C have been developed, allowing to supplement this study unit with 6 CP;
4. willingness of some students to involve more guest lecturers and to hear success stories. There have been such possibilities, but not all the students were actively using them. In the study building at Ķīpsalas Street 6, there are thematic lectures, seminars, lecture courses within projects, thematic conferences with participation of famous lecturers/ professionals organised frequently, very good thematic video presentations are recommended, including success stories, which are offered at a time suitable for students;
5. some of the graduates of academic year 2020 have experienced problems in relation to development of primary samples/ collection due to restrictions caused by *Covid-19* and these have most probably been related to not following the schedule in the autumn semester of 2019. At the same time, a majority of the graduates of this year very successfully developed creative products/ collections, which received high assessment not only in the process of defence of the Bachelor thesis, but also received various awards at highly prestigious competitions during the post-diploma period (in the competition SUSTAINABILITY IN ARCHITECTURE, CONSTRUCTION, DESIGN, in the competition of young fashion designers FASHION MANIFESTATION 2020, in the competition of higher education institutions of the Latvian Designers' Society DESIGN ARENA).

As regards graduates' comments on inappropriate (unnecessary) study courses, there are several groups:

1. the courses mentioned most often are "Economics" of 3 CP, "Mathematics" of 5 CP, "Legal regulation of business operations" of 2 CP and "Development of innovative products and business operations" of 6 CP. As regards the last one in the above list, some graduates have added that to make this course useful, it should be linked more to the specialisation of students, and this should be seriously considered in the next study year. Considering the findings, the course "Legal regulation of business operations" of 2 CP has been withdrawn from the study program due to inappropriate content. The study course "Economics" of 3 CP has also been withdrawn, because its content partially overlaps with the second part of "Strategy of craftsmanship and design" of 3 CP, "Strategy of craftsmanship and design" (study project) of 2 CP and "Development of innovative products and business operations" of

6 CP. The released credits have been used for incorporating new study courses in the study program;
2. the next group of study courses mentioned most often includes "Basics of Materials Science", "Basics of Communication", "Civil defence". Taking into account recommendations, the study course "Basics of Communication" has been moved from Part A to Part B2 of limited choice study courses;
3. students differ as regarding their preliminary knowledge, background, attitudes, financial position, understanding as to their future occupation, moreover, some study courses are easier or more difficult on individual basis. Also the time that can be devoted to studies differs. Therefore, the third group contains quite a broad range of study courses common for study specialisations, these courses have been mentioned by one or two students and rather reflect individual attitude, which cannot be perceived as students' common position.

2.6.3. Employers' surveys

The dialogue between the management of the study direction and employers helps to maintain and improve the qualify of the offered study programs. In the commission of the study direction Production and Processing taking decisions on the content of the program and changes therein, there are representatives of employers from the Association "Latvian Association of Independent Timber Harvesting Companies", “Fristads Production” Ltd, “Solutions” Ltd and “Rīgas Interjeri” Ltd. Recommendations of employers play an important role in improving the quality of the study program.

The management of the program regularly receives the opinion of employers regarding the level of knowledge and competence of the students of the program as references of the students' work during internship and by performing surveys of undertakings. During the last five years the work skills of graduates and the skills of students during internship have been assessed by the following sector undertakings:

- four undertakings of the clothing and textile sector (“ASPECT” Ltd – production of personalised sports clothing and “Thread solutions” Ltd – textile industry materials, “OWA” Ltd – clothing with sublimation printing technology, “Mans peldkostīms” Ltd),
- four interior design undertakings (“Rīgas Interjeri” Ltd, “A Dizains Un Arhitektūra” Ltd, “Kroks” Ltd, “LDU” Ltd, “FULLHOUSE” Ltd),
- nine undertakings operating in the sector of furniture design, production and sales (“Marks M” Ltd (Nakts Mēbeles), “Bend It” Ltd, “Colombinicasa Latvija” Ltd, “Lāma” Ltd, “AM Furnitūra” Ltd, “MD Noass” Ltd, “NORD MOOD” Ltd, “THOMSON Furniture” Ltd, “Latvijas Finieris” Ltd),
- two undertakings of design, production and construction of active recreation areas (“Jūrmalas Mežaparki” Ltd, “We Build Parks” Ltd),
- three design-focused undertakings/ departments (“Korporatīvais dizains” Ltd, RTU Design Factory, “VG KvadraPak” AS).

23 employers who jointly employed 124 graduates of the study program "Materials Technology and Design" have participated in the personalised survey, and two of them have participated in improvement of the study program (“Marks M” Ltd (Nakts Mēbeles) and “Latvijas Finieris” Ltd). The knowledge and skills of totally 124 employees and interns have been assessed.

The assessment of quantitative knowledge and skills by employers, ranked on the scale of 4 (four) points, indicates the positive assessment of graduates' contribution (Figure 2.1). By describing the graduates of the last five years, a majority of employers, in particular, those who employ several

graduates, admit that graduates have good theoretical and practical knowledge background, they can perform work assignments immediately or following short training, they can work in a team, perform their obligations with a sense of responsibility and at good quality. Although in-depth practical knowledge and skills in some fields should be supplemented/ improved, the existing competences are broad enough. Still, some employers mention that graduates are different, some of them lack practical skills and some other lack responsibility. At the same time, it should be concluded that in future more attention should be paid to novelties in the professional field of the sector, as well as science achievements to encourage their integration in innovative solutions and to improve the skills to describe them analytically.

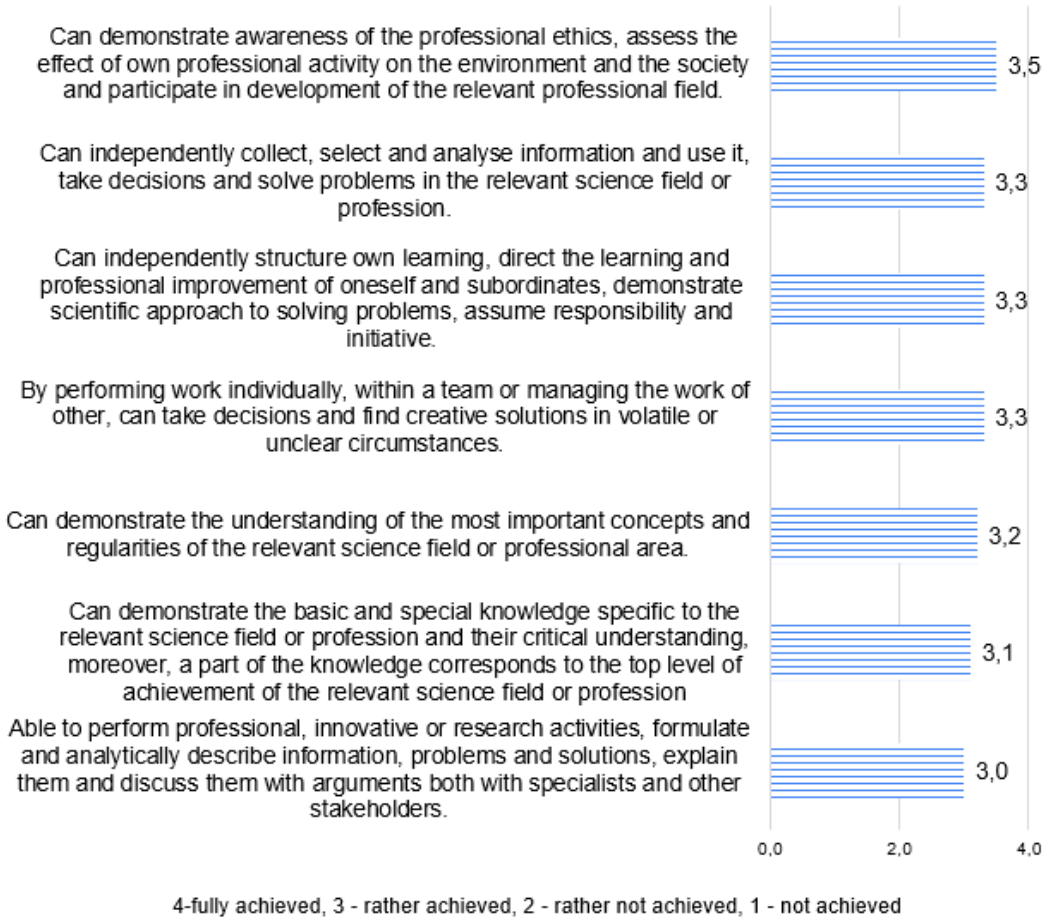


Figure 2.1. Summary of quantitative employers' assessment

In assessing the competences and skills that graduates are lacking, employers comment as follows:

- lack of communication, project planning, team management skills (5);
- lack of business knowledge, practical experience for working in an undertaking/ group (7);
- lack of understanding and practical skills in the area of furniture structures (2) and interior planning (1);
- lack of in-depth understanding of *3dsMax* technology environment and skills of its use (1), the ability to perform software engineering (1) and to express oneself by using professional English (1);
- managers of four companies who jointly employ 11 graduates of the study program note that they are not lacking any skills or competences within the scope of performing their official duties.

Employers' recommendations and comments:
Existing competences are sufficiently broad; some recommendations for achieving an even better result:

- a product designer would benefit from in-depth knowledge of the construction of engineering networks of premises;
- graduates have good preparation on marketing matters regarding the operational processes of an undertaking;
- knowledge and skills in the sales area and communication skills in direct communication with a customer and other stakeholders could be more in-depth;
- it always useful to improve the level of skills in design software to work faster;
- more frequent involvement of professionals from actual fields of operation;
- more attention should be focused on improvement of knowledge and skills of preparation and processing of printing models of polygraphic works and audio visual materials;
- more attention should be focused on the English language specific for the profession for communication in the international professional environment;
- every intern is individual, with own experience, own attitude to the work, however, the knowledge and practical skills deserve appreciation;
- The interns and graduates of RTU can handle assignments of accurate and creative issues more successfully than students of other higher education institutions; the have very good knowledge of *AutoCAD*, which is the basic software for design and development of interior design because also heat supply, ventilation and space heating engineers use this software;
- good people and diligent young people.

2.7. Provide the assessment of the options of the incoming and outgoing mobility of the students, the dynamics of the number of the used opportunities, and the recognition of the study courses acquired during the mobility.

Gaining of experience at foreign higher education institutions is important for expanding students' skills, competences and knowledge, promotion of cooperation and communication, as well as mastering of foreign languages. The students of the professional Bachelor program "Material Technologies and Design" have used the opportunity to supplement their knowledge within *Erasmus* program by both studying at foreign education institutions and doing their internships. As the study program is provided only in Latvia, there is no incoming mobility of foreign students.

RTU has established a stable and clearly understandable system of recognition of study courses completed within the framework of mobility. Prior to leaving, a student individually agrees with the director of the study program on the list of study courses at the foreign education institutions, which will be considered equal to the study courses scheduled for the relevant semester at own higher education institution. If there are any changes during the mobility program, they are agreed on electronically. After returning from the exchange program, the study courses completed by the student at the foreign education institution are recognised if a positive grade was received, which is attested by documents issued by the education institution.

Within *Erasmus* program, 0.5 to 3.4% of the total number of students decide to use the study mobility. During the report period, the activity has been highest in academic year 2016/2017 (2.7 %) and in academic year 2017/2018 (3.4 %), and the activity has been lowest in academic year 2015/2016 (0.5 %) and in academic year 2015/2014 (0.5 %). Students choose Spain (seven

students) and Austria (four students), as well as Italy (three students) as their mobility destinations most often. Following return from the mobility, depending on the program of the selected higher education institution, the relevant number of study courses is recognised, however, not all the study courses can be recognised. The initially prepared and approved study plan is adjusted at the host higher education institution due to various reasons in almost all the cases. Thus, there is non-conformity between the study courses completed at the host university and RTU, therefore, sometimes students need to complete also courses from the relevant semester in parallel to the study courses of the next semester. Mostly the students of the 3rd study year use the mobility, because in the 4th year a large part of the study time is devoted to practical development of the graduation project, and in the 2nd year specialisation courses start and students need sufficient time for completing them. Serious causes limiting the mobility of students include family circumstances and the financial position. The scholarship granted within *Erasmus*, unfortunately, not always covers all the expenses. If the family cannot provide financial support and the student loses employment, this results in a difficult financial situation not only during *Erasmus* semester, but also after returning to continue studies at RTU. Many students still have a low level of knowledge of foreign languages. Although the program of *Erasmus* semester at the education institution is in English, when students arrive there, it often turns out that the knowledge of the language of the relevant country is also needed. Some students who were planning to go to Spain or Italy, completed paid training courses of the relevant language minimum one semester before.

Within *Erasmus* program, no students have done their study internship during the period from academic year 2013/2014 to 2015/2016, 1.1% did their internship in academic year 2016/2017, 1.7% from academic year 2017/2018 to 2018/2019 and 1.4% of the students in academic year 2019/2020. Students most often choose to go for a mobility program to Spanish undertakings (five students). Students go to foreign mobility internships according to the study plan where it is schedules in the 1st, 3rd and 4th study year. There is a trend to choose foreign mobility in the first semester of the 4th study year as the concluding internship period.

III - DESCRIPTION OF THE STUDY PROGRAMME (3. Resources and Provision of the Study Programme)

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. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

Starting from academic year 2013, the study program "Material Technologies and Design" is implemented at the same place at the renovated study building of the Institute of Design Technologies at Ķīpsalas Street 6, where the Institute of Design Technologies is located in the same building with the Faculty of Architecture and RTU Design Factory. The building has been specifically designed to create encouraging environment for studies, creative work and research. All the rooms intended for the study process are equipped with multimedia hardware, i.e. a computer with the

Internet connection, a system of speakers and an overhead projector, which allows providing the study process compliant with modern requirements.

Lectures take place in the classrooms of the Institute of Design Technologies at Ķīpsalas Street 6: 206, 207, 208, 425, 426 and the shared laboratories and classrooms of RTU: 228, 117.

Laboratories and workshops with specialised technological and testing equipment are needed for implementation of studies in professional programs. See the detailed description of all the laboratories, work spaces (workshops) and their equipment used for the needs of the study program in Table 3.1.

Table 3.1

The laboratories, work spaces (workshops) and their equipment used for the needs of the study program "Material Technologies and Design" at the building of the IDT at Ķīpsalas Street 6

Room No.	Name, floor space (m2)	Description
IT laboratories		
224	Clothing and textile products design CAD/CAM laboratory (53.5 m^2).	Specialised computer controlled design and simulation systems are available to students for textile design and technical calculations, preparation of clothing details, design, template production, layout calculations, production of the cut-out assignment and placement of templates: Grafis CAD Software, Lectra, Assyst, Comtense, Pe-design, Koppermann, Tex-Design, the system of computer controlled record of work-time use SSD. Equipment: 16 computer desks, the plotter Canon iP770 for printing out drawings and details.
225	Simulation and design laboratory (79.7 m^2)	Various computer controlled design and simulation systems are available to students in the IDT computer classes, providing high quality and modern study process- the general application 2D and 3D design, calculation and image processing systems and application software: SketchUp, ArchiCad, SolidWork, Autodesk 3DS Max, AutoCad, Adobe Photoshop, Adobe Illustrator, Adobe Indesign, Adobe Dreamweaver, Comsol Multiphysics, Revit, MatLab, MS Office + MS Visio. Equipment: 20+1 computer desks.
Work spaces (workshops)		

105, 106, 107	Wood Technology and Mounting Workshop (375.4 m^2)	The workshop is related to several study courses of professional specialisation where acquired theoretical knowledge is supplemented with practical skills. Students master not only the use of technological equipment, but also design and production of products. The workshop provides understanding of medium-scale production processes, it is suitable for implementing the processes of the concluding design stage - production of models, as well as for starting the production process. The workshop is suitable for performing various scientific research projects related to research of joints, structures, materials and products and their production. Outside the study process, the workshop is used for arrangement and holding of seminars and creative workshops. Equipment: Felder: Spindle moulders, Sliding table saw, Band saw, Vertical drilling machine, Planer-thicknesser machine, Dowel boring machine, Horizontal mortiser machine, Belt sander machine, Edgebander machine, Frame press and mounting tables, Auxiliary surfaces, Scaffolding, Vacuum press; CNC milling- engraving machine; Various Festool power tools. The goal is to provide both technical and scientific support to students, researchers for production and research of various wood materials, products of composite materials (primary samples, models, joints).
201	Sewing workshop (88.9 m^2)	The workshop is suitable for sewing of garments and their collections, practical classes. Equipment: 9 lockstitch sewing machines; one 5 thread industrial overlock sewing machines, two 4 thread household overlock sewing machines, 5 thread (3 needle flat seam sewing machine; buttonhole machine; equipment for inserting press buttons and other metal elements, two ironing stations with a steam generator, fusing equipment (continuous operation press); 8 desks); 1 computer desk, a white board, a water treatment device.
202, 202a	Fashion design master workshop (156.8 m^2)	The workshop is suitable for development of garments starting from sketches to ready collections. Students acquire both theoretical knowledge and work in practice, master basic knowledge and specific skills for design of clothing - modelling, construction, cutting, sewing and fitting of clothing. The technical equipment of the laboratory conforms with the work environment of a production undertaking. The laboratory is also suitable for development of clothing design. For research purposes the laboratory prepares various samples for in-depth investigation by the Material sciences laboratory. The equipment is suitable for development of clothing: Tables for cutting; ironing equipment - Batistella 2 pcs.; a steam press; sewing machine Siruba L818D-H1; sewing machine Juki DU-1181N; sewing machine Juki DDL-8700B-7; sewing machine Brother Z-8550A-031; overlock Juki MO-6714S, tailors mannequins, holders for placing products.

203	Tie-dyeing Workshop (11 m^2)	The workshop is suitable for tie-dyeing and artistic treatment of cloth. It is equipped with a bath, cloth steaming equipment Uhlig Fixiergerät No.0043 and a microwave oven.
209	Weaving Workshop (54.4 m^2)	In the workshop it is possible to weave both traditional and smart cloth. Students learn weaving basics, production of cloth of a varied level of complexity (including multi-layer cloth), production of smart textiles. Samples for study and graduation projects and research can be produced. Equipment: Equipment: handlooms (width: 1m; 1,5m; 2m), including that one of the looms is equipped with a second warp beam - it is possible to weave multi-layer fabric; programmable 24 shaft weaving loom (width 40 cm) - for production of complicated woven fabrics.
210	Knitwear workshop (59.4 m^2)	In the workshop it is possible to produce both traditional and smart knitwear cloth and ready products. Students have an opportunity to learn basics of knitting, production of complicated knitted ornaments, development of smart textiles. Samples for study and graduation projects and research can be produced. Equipment: double bed 5th category knitting machines (8 pcs.), a stitch-bonding machine (for joining knitted parts), sewing machines (including an overlock).
Laboratory premises		
104a	Knitwear and textile laboratory (73.6 m^2)	Equipment can be used to prepare fibrous web for samples of nonwoven or composite materials; to prepare a warp beam for weaving, to weave traditional and smart fabrics. Equipment: automated projectile weaving loom, warping machine with creel, laboratory carding machine, yarn twisting machine.

109	Materials, technologies and design laboratory (57.8 m^2)	All the study courses of the professional specialisation of wood products and interior design and technologies are provided at the laboratory. The premises allow linking the theoretical and practical work, as it is located next to other laboratories. In the laboratory there is a wide range of samples and other demonstration aids: demonstration samples of materials (samples of plate and sheet materials, collection of wood species with various cross-sections, according to the scale 1:1, wood composites); a collection of wood joints; samples of fittings (hinges, moving mechanisms, etc.), samples of cutting tools, samples of building structures, samples of structures, mechanical/ moving samples, product dummies and preliminary samples.
111	Wooden materials research laboratory (29.4 m^2)	The laboratory is closely linked with the laboratory of materials, technologies and design, as it supplements it sample base. The laboratory provides equipment for determining the humidity, weight, density of wood, wood-based and various sheet and plate loose materials, performance of the granulometric analysis of loose materials by using a shaking sieve, determination of mechanical properties of various materials by using the universal testing device (for perpendicular removal of nails or screws, three-point bending test, sample tensile test, pryout test of glued structures, rupture test of samples). Various measuring tools are available in the laboratory (liners, sliding calipers, measuring tapes, micrometres). There are various samples of finish materials and samples of finish layers, samples of upholstery materials, samples of decorative materials to be glued to surfaces.

112, 113	Wood processing laboratory for work with manual tools (39.7 m^2 and 16 m^2)	The laboratory provides possibilities for acquisition of basic knowledge and wood processing and lay-out design, as well as completion of practical assignments. The laboratory is intended for working with massive wood and various plate materials; it is suitable for performance of lay-out design works and production of crafts items by using manual or manual power tools. Scientific research related to production of various joints, production of surface textures, research of processing of materials by using manual or manual power tools can be performed at the laboratory. Equipment: various manual tools, including various manual saws (rigid blade cross-cut saw: one-man saw, jig saw, fretsaw), carpenter and woodworker chisels, planes of various types (draw shave, jointing plane, end plane, rabbet plane), files of various grade, range and shape, measuring tools, marking tools and auxiliary tools. There are also several manual power tools, radius cross-cut saw machine, band grinding machine, eccentric grinding machine, drilling machine, battery operated screwdriver, as well as modular devices - a band saw and disc grinding machine.
114	Layout design and wood processing laboratory (17.9 m^2)	The laboratory is suitable for performance of lay-out design works and production of crafts products, as well as completion of other practical assignments. Surfaces are provided in the room, allowing to work on various scales. In the laboratory there are various devices and manual tools which are required for processing of various cardboards, wood materials and polymeric sheet and plate materials. Students can independently perform work by using various techniques, mainly by reduction of material, shaping of material, casting of material and adding of material.
211	Sewing machines mechanics and embroidery laboratory (46.8 m^2)	It provides laboratory assignments in the following subjects: "Basics of Machine Embroidering" and "Machine Embroidering". Research in the science direction "Integration of electronic elements in cloth by embroidery" can be performed in the laboratory. Equipment: laboratory models of sewing machines for studies - a single needle lockstich, two needle lockstich, single needle hidden stich, two needle flat stich, single needle edge chainstich, two needle chainstich, figural button hole equipment. Embroidery machines - Brother PR600II and Innovis 750E and embroidery computer software Wilcom (embroidery studio e4). Straight knife cutting equipment.

212, 213	Materials sciences laboratory (59.1 m^2 and 77.1 m^2)	The laboratory equipment provides testing and research of the most common physical properties of cloth. The equipment is used both in the study process and scientific research. In some cases the equipment is used for performing external services. Equipment: Sweating Guarded Hotplate M259B, SDL Atlas. Martindale Abrasion and Piling Resistance Tester, Air Permeability Tester, Wrinkle Recovery Tester, Crease Recovery Tester, Shirley Stiffness Tester, Crockmeter/Rubbing Fastness Tester, Fabric Drape Tester, Spray Rating Tester, Universal Testing Machine Instron with software for mechanical properties identification of fibre, threads and fabrics, Q-Sun Xe-2 Xenon Test Chamber, BINDER Constant climate chamber, Tumble Dryer, Washing Machine, Water Resistance Testing Machine, Electronic Balances, Yarn Twist Testers, Yarn Unbalance Tester, Yarn Strength Evaluation Tester Under Multiple Tension, Optic Microscopes, Yarn Examining Machine, Wrap Reel, Dynamometre for determination of the strength of fibre strands.
214	Anthropometric laboratory (51.8 m^2)	The laboratory operation is based on studying measurements and build peculiarities of a human body, which is used for improvement of clothing and other products and analysis of their interaction with the human body - fit and ergonomics. On the Bachelor level students are introduced to the principles of operation of the equipment and are scanned and trained for use of manual methods within the study course. The functions of AnthroScan in processing of measurements and additional use for investigating peculiarities of the human body are presented to the Master level students. Computerised design and 3D prototyping system is used for experimental designing of various assortment of clothing and analysis for completing various research processes and graduation projects. The human body 3D scanning device Vitus Smart XXL® (Human Solutions Group GmbH) with the data processing system AnthroScan. Tools: anthropometers, measuring tapes, calipometers for obtaining the measurements of the human body by manual methods. Computer systems: CAD/CAM system Assyst with the virtual prototyping module Vidya.

422, 423, 429	Measurement laboratory ESM (16.7 m^2, 38.4 m^2)	The laboratory is suitable for performing various research and measurements related to nano-coatings and production of nano-fibre from polymeric liquids. The theoretical knowledge acquired in the research laboratory are supplemented with practical laboratory assignments, students master basic skills for performing research, and also learn in-depth research and use of various equipment. The laboratory is linked to the following study courses: the research seminar, textile physics, methodology of research of materials, product science, wood physics, as well as performance of the research Master and Ph.D thesis. Equipment: a magnetron sputtering device (applying metal and semi-conductor nano-layers onto various surfaces); an electrical spinning device (production of nano-fibre from polymeric liquids); as well as a thermal cabinet for large samples.
424	Measurements laboratory (21.6 m^2)	The laboratory is suitable for performing various practical research, testing of materials and identification of their properties. The laboratory is linked to the following study courses: the research seminar, textile physics, methodology of research of materials, product science, wood physics, as well as performance of the research Master and Ph.D thesis. Required climate conditions can be provided and adjusted in the laboratory. Preparatory works for performing experiments at ESM measurement, wood materials and textile materials research laboratory are performed in this room. Equipment: Bruker AFM atomic forces microscope; Permatest SENSORA device for determining the heat resistance and vapour permeability of cloth; Fungilab viscosimeter (the possibility to determine the viscosity and electrical conductivity of liquids); Motic microscope with a camera and 100x possible magnification; magnetic and mechanical mixers; Rhopoint device for determining the surface gloss.
425	Textile materials research laboratory (30.2 m^2)	The laboratory is used for research where thermal treatment is required, for example, research of new materials or their coatings. The laboratory is linked to the following study courses: the research seminar, textile physics, methodology of research of materials, product science, wood physics, as well as performance of the research Master and Ph.D thesis. Equipment: autoclave (for sterilisation), thermal cabinet (thermal treatment of samples) and Permatest equipment for determining the heat resistance of cloth, an interactive board and a projector.

426	Wooden materials research laboratory (27 m^2)	The laboratory is suitable for research of various materials or their coatings to nano level, research of development of new materials, research of composite materials. The laboratory is linked to the following study courses: the research seminar, methodology of research of materials, product science, wood physics, as well as performance of the research Master and Ph.D thesis. Equipment: Atomic force microscope, viscometers (for determining the viscosity of liquids), optic microscope (100x magnification and a video recording function), ultrasound mixer (in a set with an electrical spinning device), calendering machine (pressing of sheet samples with controlled pressure and temperature) and a device for determining the surface gloss, DVG device. A compressor in a set with AFM and a portable pH metre, as well as a small-scale vacuum pump and heating stove and a mixing mixer. An optic microscope with x20 magnification, conductivity meter, thread scales, two magnetic mixers.

The laboratory equipment is regularly improved by adding furniture, additional lighting, equipment and machinery is procured for the needs of the study process, as well as other activities are implemented, for example, development of work safety instructions and presentations for the laboratory equipment, labelling of the laboratory environment with safety signs, signal painting, production and installation of safety posters, production and installation of safety walls in the Wood technology and mounting workshop.

The equipment of the wood processing workshops has been considerably improved during the report period.
In 2015, with the support of the ERDF, the Wood processing workshop of IDT was equipped with modern equipment of the company "*Felder*" position type equipment, module equipment and manual power tools of the company "*Festool*" with the total value of 92,746 EUR, by preparing wood processing machinery for operation, defining work areas and developing the complete set of safety measures for operating the equipment included in the set: final trimming circular saw *Felder* K700s, band saw *Felder* N4400, milling machine *Felder* F700z, combined dressing-thickness bed-type miller *Felder* AD941, universal multiple-spindle drilling machine *Felder* FD921, vertical single-spindle drilling machine *Felder* DR80, horizontal drilling machine *Felder* FD250, vacuum press VP-3000W, manual edge gluing machine *Felder ForKa Eco*, narrow band grinding machine *Felder* FS722, CNC milling, engraving machine CNC *Step* S-1400/T, *Festool* module sets of power tools.
In 2019, with the financial support of RTU, the equipment of the wood processing workshop was supplemented with a pneumatic glue application device *Leimfix*, *Festool* set of vacuum devices for fastening of parts, a surface gloss meter *Novo-Gloss* 60, stereo microscope *Motic* SMZ 171 TLED, universal testing device *FormTest* with additional accessories, rotation viscometer *FungiLab* VL210002.
In 2013 cooperation was started with the distributor of *Festool* manual power tools in Latvia SIA "*Festool LV*", which has provided various manual power tools for the use of the personnel and students of the Department of Design and Materials Technologies: angle saw *KAPEX KS 120*, hollow milling machine *DOMINO DF 500 Q-Plus*, eccentric grinding machine *ETS EC 125/3 EQ-Plus*, vibration grinding machines *RS 300* and *RS 200*, band grinding machine *BS 75*.

The equipment of the wood processing laboratory has also been supplemented thanks to regular participation of the academic staff in various projects. For example, in the projects funded by the fond of students' initiatives of the Parliament of Students of RTU "Supplementing of the wood materials research laboratory" (2019) and "The wood processing laboratory in work with manual

tools” (2016), the obtained funding amounted to 1522 EUR aimed for supplementing the technical and material base of the laboratory for working with manual tools and improving the work conditions in laboratories (112, 113, 114), improving the level of knowledge regarding the construction of manual tools and working with them, promoting the scientific side of studies at a higher level, as well as raising the awareness of the study direction and attraction of new students. Participation in the national competition of young professionals “*SkillsLatvia*” in 2017 and 2018, by providing technical (wood processing equipment) and intellectual support, allowed supplementing the equipment of the Wood Technology and Mounting Workshop (105) in the amount of 2500 EUR. Also in August 2017, in the summer school “*Wood Craft and Art*” (26 participants) in cooperation with "Vienkoču parks", where methodological and technical provision was prepared, materials and wood carving tools were procured.

The equipment of the Fashion Design Master Workshop and the Sewing Workshop was considerably supplemented during the preceding report period. During this period regular service and maintenance of the equipment is performed. 10 tailors mannequins and six portable stands for storing produced garments were purchased for the needs of the workshops in 2020.

Automated window blinds are installed in the windows of several workshops and laboratories (201, 202, 202a, 205, 429).

Students have *MSOffice* and specialised computer software necessary to acquiring the program. In all the RTU premises students and the academic staff can use free of charge *Wi-Fi* connection.

Starting from academic year 2015/2016, the biggest IT laboratory (computer class – 228) with 30 new computers is under the management of the RTU Study Division, but it is used also by the students of the study program "Materials Technologies and Design".

For the majority of the academic staff a computer and a well equipped work desk is provided at Ķīpsalas Street 6, in the rooms intended for the academic staff: 102, 107, 108, 111, 204, 215–222, 226, 239, 430–432.

The methodological materials are regularly updated for all the study courses and the academic staff uploads them to RTU *Ortus* environment.

The methodological provision is supplemented also by the methodological materials and monographs prepared and published by the academic staff, for example, the brochure by professor Skaidrīte Reihmane “Theory and technology of textile printing” for learning textile chemistry, which was reviewed by the professor of the Institute of Design Technologies Ilze Baltiņa; the monograph by the assistant professor Juris Emsiņš “Wood in the life of the Latvian state and people” (Šalkone, 2015), as well as the book by Juris Emsiņš and Lāsma Āboliņa “Latvian wooden chairs” (Madris, 2020), which provides extensive information for the students of the specialisation of wood products; the associated professor Vilnis Kazāks and the assistant professor Juris Emsiņš are co-authors of the encyclopaedia about development of wood processing in Latvia presenting development and problems of this industry to students. The material technical provision for the speciality of the Wood Products and Interior Design and Technology is regularly supplemented with catalogues of finish materials, lighting fixtures, furniture and new equipment from the leading producers of Great Britain, Japan, Germany and Italy.

In order to improve the study environment of RTU, a large scale project “RTU – a City in the City” is being implemented, and its implementation will result in creating the most modern study centre of engineering sciences in the Baltic region - a student campus which will consist of RTU faculties, administrative buildings and the Scientific Library in future, providing more convenient access to services.

The RTU Scientific Library is the oldest university library in Latvia and its strategy and operational goal is mainly related to the goals and objectives of RTU. The library maintains subscription for more than 20 data bases (the full list of data bases is available at: https://www.rtu.lv/en/studies/scientific-library/electronic-resources). For the students of the study program "Maerial Technologies and Design" there are mainly data bases like EBSCO, LETA, *Science Direct*, *Scopus*, *Web of Science* etc. The RTU Scientific Library was among the first ones in Latvia introducing RFID technologies, thus becoming a modern university library. The self-service machine for return and receipt of books is among the major innovations which made the library more convenient for use for students. This means that it is no longer necessary to queue for a book and students can receive and return books without the librarian's assistance. In the library there is a reading room open 24/7, which is equipped accordingly and available to students following registration in RTU *Ortus* environment. In the library there are the latest periodicals, statistics materials, books, conference materials on the matters of economics and business.
Every year the library funds are supplemented with both teaching and scientific literature, as well as periodicals usable for the study work. Financing is allocated every year for purchasing literature for the needs of the study program, and the academic staff orders necessary issues, which are available at the RTU Scientific Library at Paula Valdena Street 5, as well as by using e-resources. The study program is included in the specialization field “Materials Technology and Design” of the study field “Manufacturing and Processing”. During the reporting period, a total of 91 special book units were purchased for the study field, of which 49 units are related to the study program “Materials Technology and Design”. In addition to them, clothing design and technology students can also use specialized books purchased for the study program “Clothing and Textile Technology”.

Also other RTU infrastructure elements are available for the needs of students and the academic staff, like canteens and cafes, the student centre, students' hostels, RTU sports and recreation centres, a swimming pool, the RTU Museum of History, etc. In the premises of RTU there are vending machines for buying drinks and snacks, potable water is available free of charge.

The state budget grants and students' tuition fees are utilised for implementation of the study program. Information regarding the financial resources of the professional Bachelor study program "Material Technologies and Design" is presented in Table 3.2.

Table 3.2

Financing of the professional Bachelor program “Material Technologies and Design”

Academic year	Grant, EUR	Study fee, EUR	Total funding, EUR	Costs per student, EUR
2013/2014	398,580.00	7,836.00	406,416.00	3,866.00
2014/2015	411,131.93	4,486.17	415,618.10	3,866.02
2015/2016	375,354.41	1,289.32	376,643.73	3,866.02
2016/2017	371,494.03	2,169.88	373,663.91	3,866.02
2017/2018	410,839.59	–	410,839.59	4,040.66
2018/2019	428,056.09	–	428,056.09	4,229.68
2019/2020	512,469.86	2,240.00	514,709.86	4,405.04

Total	2,907,925.91	18,021.37	2,925,947.28	

The tuition fee for each academic year is determined separately by the decision of the RTU Senate On approval of the tuition fee, the registration fee for applicants and the fee for settling academic debts for each academic year. The tuition fee procedure is regulated by the regulations on the tuition fee payment procedure at RTU. They stipulate that the procedure for payment of tuition fees is determined in accordance with the Agreement on Studies at RTU at the expense of natural or legal persons (see the appendix Sample Study Agreements). The student can choose to divide the fee for the study year into two parts - one payment for each study semester, or to divide the fee for the study year into eight parts - payment four times a semester, which includes one payment for the first two months of the study semester and three payments, each in the amount of one month's tuition fee, for each month of the next study semester.

As students tend to drop out for various reasons, budget space becomes available. For a fee, the student can participate in the annual competition for study places paid for by the state budget, as a result of which the student's study funding is changed to the state budget funding.

The column “Tuition fee, EUR” of Table 3.2 shows the total income from the tuition fees collected in the respective academic year. A different number of students study for a fee in each academic year (see Annex 5 Statistical data on students). All of the above affects the fact that the total tuition fee charged in certain study years is lower than the indicated costs per student.

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

III - DESCRIPTION OF THE STUDY PROGRAMME (4. Teaching Staff)

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

46 members of the academic staff are involved in the implementation of the professional study program "Material Technologies and Design". It is basically implemented by 29 members of the academic staff of the Institute of Design Technologies (hereinafter referred to as IDT (20 of them are from the Department of Design and Materials Technologies (hereinafter referred to as DDMT), 9 are from the Department of Clothing and Textile Technologies (hereinafter referred to as DCTT), and 17 members of the academic staff are from other structural units of RTU. 93% of the academic staff involved in implementation of the study program are elected to academic and/or scientific positions of RTU.

In comparison to the beginning of the report period, academic year 2013/2014, the number and

structure of the academic staff has slightly changed. The total number of the academic staff of IDT employed in the study program has increased from 26 to 29. In academic year 2020/2021 there were 1 professor, 5 associated professors, 3 assistant professors, 6 assistant professors (practical), 10 lecturers, 1 senior researcher and 3 assistants. In comparison to the preceding period, the number of assistant professors (practical) has increased considerably, also the number of associated professors and assistants has increased, however, the number of assistant professors and lecturers has decreased.

The composition of the academic staff has slightly changed in almost all the groups of the academic staff and this is related to improvement of qualification. During the report period, five members of the academic staff: Edgars Kirilovs, Ilze Gudro, Zane Zelča, Gaļina Terļecka, Jānis Dāboliņš, have defended their Ph.D thesis, received the Ph.D degree and elected to the positions of an associate professor, assistant professor or lecturer. Lecturers A.Krieviņa-Siliņa, G.Zommere, A.Broks and D.Šķiņķe have been elected to the positions of assistant professors (practical) and assistants J.Kalniņš and A.Ķīsis have been elected to the positions of lecturers during the report period. Also Ph.D students I.Gūtmane, I.Zotova, A.Ķīsis, B.Lukaševiča, I.Baķe are involved in the study process, thus promoting introduction of new teaching methods and linking of the study process with the themes of their scientific research.

During the report period professors A.Viļumsone and V.Kazāks, and the assistant professor (practical) J.Emsiņš have retired. The specialised study courses in the specialisation of wood products and interior design delivered by them have been taken over by assoc. professor E.Kirilovs, lecturer J.Kalniņš and assistant professor (practical) A.Broks, and in the specialisation of clothing design and technologies by assoc. professor D.Beļakova and assistant professor G.Terļecka. The study courses delivered by the assistant professor (practical) A.Bute have been taken over by the lecturer A.Volmāre.

Also the age structure of the academic staff has changed. The mean age has decreased in all the group, attesting the renewal of generations of the academic staff. The overall mean age of the academic staff has also decreased and it is 45 years. The changes are presented in Table 4.1.

At present 66 % of all the academic staff elected to academic positions at RTU and involved in the study process are holders of Ph.D or habil. Ph.D degree.

Table 4.1

Changes in the composition of the academic staff (employed at IDT) in the study program "Material Technology and Design"

Academic year 2013/2014			Academic year 2020/2021		
Position	Number	Age, years	Position	Number	Age, years
Professors	3	68	Professors	1	78
Associated professors	3	54	Associated professors	5	49

Assistant professors	6	52	Assistant professors	3	42
Practical assistant professors	2	60	Practical assistant professors	6	56
Lecturers	12	41	Lecturers	10	37
Senior researchers	-	-	Senior researchers	1	54
Assistants	-	-	Assistants	3	36
Mean age		49	Mean age		45

Changes in the number and composition of teaching staff have not significantly affected the quality of studies, providing competitive professional higher education of 6th LQL/ 6th EQL and the fifth level and training of students for work in the field of design and technologies. The teaching staff is highly qualified professionals, also with practical experience in the industry.

4.2. 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.

Highly qualified academic staff from six RTU faculties, nine institutes and eleven departments are involved in implementation of the study program "Material Technologies and Design". The program is basically implemented by the academic staff of the Department of Design Materials Technologies and Clothing and Textile Technologies of the Institute of Design Technologies.

The qualification of the teaching staff involved in the implementation of the study program complies with the conditions for the implementation of the study program and the requirements of the regulatory enactments specified in the state.

In selecting and involving the academic staff, the program management aims to achieve the highest possible efficiency of the study program and to provide an opportunity for students to attain the envisaged learning outcomes. For the purpose of improvement of the study quality, guest lecturers and industry professionals are involved, thus providing an opportunity for students to gain broader professional knowledge.

Since the beginning of 2019, the academic staff of the study program has an opportunity to improve their qualification by participating in internships within ESF project No. 8.2.2.0/18/A/017 "Strengthening of Academic Staff of Riga Technical University in Strategic specialisation Areas". The academic staff may use internships in various Latvian companies for the total volume of 200 hours. 12 of the academic staff members involved in implementation of the program use this opportunity. The opportunity to improve the knowledge of the English language was used by 13 members of the academic staff (100 or 200 hours).

The academic staff actively participates in the scientific research process, they are members of professional associations, 14 members of the academic staff are experts of the Latvian Council of Science.

The study process integrates the latest and current scientific research in the field and its results; current developments are considered in the local and global context, the project-based training approach, the user-focused design and creative thinking methods are integrated therein. Theoretical knowledge is linked with the practice, sector undertakings are visited, information from the latest research and technologies from specialised international exhibitions is integrated in lectures.

Research components in work with students are provided by participation in scientific conferences and development of publications. Pedagogical qualification upgrading courses are attended. Participation in various seminars ensures knowledge of the latest trends, promotes the acquisition of new methods, which allows students to acquire current developments related to the industry.

The following academic staff of IDT is involved in implementation of the study program:

Silvija Kukle, Dr. habil. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry (hereinafter referred to as FMSAC) IDT professor. Professional experience: academic work experience of 47 years in a higher education institution, two years as a production manager, seven years as a member of the board of companies. Scientific activity and research has been carried out since 1976, working as an executor, responsible executor, visiting researcher and project manager, specialising in the development of software-controlled engineering systems, novel textiles modified at nano-level, functional nanofibres and laboratory prototypes of natural fibre-based composite. Has participated in international conferences both with reports and as a member and reviewer of the Scientific Committees of International Conferences. She is an expert of LATSERT and the Latvian Council of Science, the author of more than 200 scientific publications, as well as the scientific supervisor/co-supervisor of 12 successfully defended Ph.D thesis. In the academic work – conducting courses where students acquire research planning, data processing and interpretation methods, product, and process and consumer research. The study process integrates the latest and current scientific research in the field and its results; current developments are considered in the local and global context.

Edgars Kirilovs, Dr. sc. ing., RTU, FMSAC IDT DDMT, Associate Professor since 2020, Leading Researcher since 2014 and Head of the Department since 2017. Professional experience: more than 10 years of academic experience in a higher education institution, nine years of practical experience in furniture manufacturing and design companies. Scientific activity and research have been carried out for more than 10 years, specialising in the design and engineering of wood products, adapting the aforementioned to the possibilities of modern technologies. The opportunities of the *Erasmus* + academic staff exchange programme have been used by periodically visiting foreign research institutes to exchange experience. Renewable resource boards used for room comfort (acoustics, heat storage capacity) and furniture material structures are

researched and developed, as evidenced by participation in international scientific conferences and publications. Competence in materials and technology issues is based on work in both international and national research projects as a project manager and a researcher. Expert of the Latvian Council of Science since 2014, in the Wood Materials and Technologies sub-field of the Materials Science field. Membership in the Furniture Producers Association in Latvia of Latvian Forest Industry Federation since 2017. Elaborator of the task in carpentry of the National Skills Competition for Young Professionals "Skills Latvia 2017" and nomination manager of the competition. The latest and most current scientific research, their results, current events from international industry exhibitions are integrated in the study process at all levels. The conducted study courses are related to three areas of specialisation, such as advanced product design software training, wood products design, technologies and production, and material development, research and integration into products.

Andra Ulme, Dr. arch., RTU, FMSAC IDT associate professor and leading researcher at the DDMT. Professional work experience since 1987. Academic and scientific work in a higher education institution has been performed since 2004, specialising in interior design, product design, material design and technology. The courses conducted can be divided into three areas of professional competence and are related to design theory, problem solving in interior design and research in ergonomics, and solving issues of art pedagogy. Work experience is based on more than 45 scientific publications. Competence in design and technology project management and sustainability issues is based on work in several international (*Erasmus* +) and national (ERDF) research and education projects as a project expert and researcher. Participation in international scientific conferences in the fields of materials science, pedagogy, architecture and construction, including publications and reports on the progress of scientific research. The study process includes the latest findings and the most relevant scientific research in the above mentioned fields, which have been gained by constantly improving her qualification attending courses, taking part in scientific conferences and seminars. Conducting of the course is based on 25 years of experience in managing construction projects in the field of architecture and interior design, arranging international design exhibitions, in internship preparing and training designers in a design company – more than 60 new professionals in 15 years. Scientific activity and research is carried out in the following areas: pedagogy in the field of art and architecture, ergonomics, sustainable environmental development and wood architecture, design and problems and tendencies of interior furnishing. During 16 years, more than 40 Bachelor and 26 Master thesis have been successfully supervised and defended, Ph.D thesis in architecture and urban planning have been reviewed, and one Ph.D thesis in materials science has been conducted. Participates in several scientific and practical international projects. As from 2018 international research and academic cooperation with "*Southern Federal University*" *Academy of Architecture and Arts*, *The State Museum-Reserve Sholokhov Rostov Regional Branch of VOOPIK*, *Union of Architects of Russia*. Within the framework of academic staff mobility, since March 2019, two study courses for architecture students of the Academy's Ph.D study programme and one course for Master's students in applied art and design have been systematically conducted in person and later remotely.

Ilze Baltiņa, Dr. sc. ing., RTU, FMSAC IDT leading researcher at the DCTT. Academic and scientific work in the higher education institution has been performed since 1989, specialising in clothing and textile technology. Work experience is based on more than 70 scientific publications. The rights of an expert of the Latvian Council of Science in the sub-branch of textile and clothing technologies in the field of material science. The conducted courses are related to three areas of specialisation, such as textile production technologies and new product development, textile research, quality properties evaluation and Smart Textiles. Regular supervision of elaboration of graduation papers in Master's and Bachelor's professional studies. Under the supervision of I. Baltiņa, a Ph.D thesis in materials science has been developed and defended. The knowledge and experience gained in

projects and scientific work are integrated in the teaching process. As a leading researcher, she participates in both international (*Erasmus* +, INTERREG EUROPE) and national research and education projects. She is the Deputy Chairwoman of the RTU Trade Union and the Chairwoman of the IDT Trade union office. Member of the Latvian Council of Experts in the Textile, Clothing, Leather and Leather Products Industries. Member of the scientific editorial board of the 19th International World Scientific Textile Conference Autex 2019, as well as a reviewer of several scientific journals and collections of articles (*Cellulose*, *Journal of Industrial Textiles*, Žurnāls *Textiles un Light Industrial Science and Technology*). Participated in the preparation of two RTU patents. Participated in the exchange of experience of *Erasmus* academic staff. Regularly participates in professional development and training seminars.

Dana Beļakova, Dr. sc. ing., associate professor. Professional work experience since 1992. Her work at the university began more than 18 years ago, performing pedagogical, scientific and administrative work in 2003. The conducted courses can be divided into three areas of professional competence and are related to clothing design and production (including clothing design and technology, work performance rating in clothing production companies), design and technology project management and solving sustainability issues. Competence in design and technology project management and sustainability issues is based on work in several international (*Erasmus* +, Interreg Europe) and national (ERDF, FLPP) research and education projects as a project manager, coordinator and researcher. The research component in working with students is provided by participation in scientific conferences and more than 50 publications in areas of competence. RTU pedagogical qualification upgrading courses and various seminars have been regularly attended, ensuring the knowledge of the latest trends in the field, promoting acquisition of new pedagogical and professional methods, which allow students to acquire latest developments related to the industry. The opportunities of the *Erasmus* + academic staff exchange programme have been used by periodically visiting foreign universities for experience exchange. Participation in the development of modular vocational education programmes and in the development of the digital teaching tool “Manufacture of sewn products”. Participation in the work group in the development of the professional standard “Clothing and textile technologist”. Director of IDT since 2017 and Head of the Department of Clothing and Textile Technology since 2016. Expert of the Latvian Council of Science since 2010 in the Materials Science sub-branch – Textile and Clothing Technology. Several awards granted by the Prime Minister of the Republic of Latvia have been received for preparing excellent contestants for participation in the European Young Professionals Skills Competition “*EuroSkills*” in the field of fashion technologies.

Ilze Gudro, Dr. sc. ing., RTU, FMSAC IDT assistant professor at the DDMT, director of RTU Research Centre for Engineering History. Academic and scientific work experience in a higher education institution (RTU) since 2011. Scientific work experience is based on 26 scientific publications, one published book, work as a scientific reviewer for a scientific monograph, work as a leading reviewer for a scientific monograph, seven (7) Bachelor and ten (10) Master thesis have been reviewed, 11 graduation papers have been reviewed. The conducted courses are related to interior design, design analysis and criticism, management of design events, organization and management of various events, attraction of companies for collaboration organizing practical classes, as well as organizing charity projects with Master’s students. Practical experience and creative work since 2008 are manifested in regularly organized exhibitions, where the best works of RTU IDT graduates are exhibited – RTU stand at the International Furniture Exhibition BT1 (since 2008); RTU IDT stand at the exhibition School (since 2010); RTU IDT graduate exhibition “Ķīpsala Design Code” (since 2012); RTU IDT stand at the International Design Exhibition “Design Isle” (since 2013); RTU IDT fashion show “Ķīpsalas pavasaris” (Ķīpsala Spring) (since 2014), creation of RTU History Museum expositions (since 2017). In 2013, I. Gudro started promoting RTU IDT on the social network facebook.com. Ten years of experience have helped I. Gudro to summarize and evaluate, as well as

to classify and develop different types of activities to achieve better results. Her main academic interests are the history of RTU, the history and development of Latvian design, engineering, interior, furniture and product design, and materials science.

Inese Ziemele, Dr. sc. ing., RRTU, FMSAC IDT Associate Professor at the DCTT. Director of the study programmes WCV0, WDV0 “Clothing and Textile Technology” and the study direction “Production and Processing”. Professional experience: more than 20 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, leading researcher and associate professor. Research areas: sewn products manufacturing technologies, their management and logistics of clothing factories; research on technological solutions, and smart and functional clothing comfort; clothing assortment and quality research. Practical work experience in the position of a company sewn products manufacturing technologist. Research components in work with students are provided by participation in scientific conferences and development of publications. Periodically attends *Erasmus* + mobility activities in foreign universities, giving lectures at foreign universities, as well as participating and reporting at scientific conferences. Regularly working as a supervisor of Bachelor and Master thesis. Attended RTU pedagogical qualification upgrading courses. Additional regular participation in various seminars and international exhibitions of the industry, ensuring knowledge of the latest trends in the clothing and textile industry; promotes the acquisition of new methods, which allows students to acquire current developments related to the industry. She is an external member of the Sectoral Expert Council (NEP) (Textiles, Clothing, Leather and Leather Products Industry). Participated in the development of modular educational programmes and examination tasks for professional qualifications. One of the authors of the digital teaching too “Manufacture of sewn products”. Regularly participates in international research projects. She has been a member of the jury commission of the National competition for young professionals *SkillsLatvia*.

Gaļina Terļecka, Dr. sc. ing., assistant professor and researcher at RTU FMSAC IDT in the DDMT. Academic and scientific work in the higher education institution has been performed since 2007, specialising in clothing and textile technology. Work experience is based on 17 scientific publications. The conducted study courses are related to clothing design, technology, and sizing. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. As a researcher and expert, she has participated in several international and national research projects. Participated in professional development and training seminars. Participated in the development of modular professional education programmes “Professional Qualifications in the Textile, Clothing, Leather and Leather Products Industry” and in the development of the professional qualification exam programme of the module “Block Pattern Grading”.

Uģis Briedis, Dr. sc. ing., RTU, FMSAC IDT associate professor at the Department of Clothing and Textile Technologies. Professional experience: more than 15 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, leading researcher and associate professor. M.Eng in Textile Machinery Mechanics. The conducted study courses can be divided into two areas of professional competence and they are related to clothing production technologies and production equipment (their mechanics and operating principles), and sewing factory design (sections, production flow design, production equipment selection and location). Fields of research: research of technological solutions for smart and functional clothing (sub-fields: use of alternative energy sources in smart textiles; use of embroidery technology in prototypes of technical textiles); the latest equipment and technologies for the production of sewn products. Practical work experience in the trade of sewing and embroidery equipment. Participation in scientific conferences and development of publications for industry journals ensures the acquisition of the latest technologies and equipment and the research components for academic work. Supervisor of

Bachelor and Master thesis. Attended RTU pedagogical qualification improvement courses, seminars and international exhibitions of the field, which ensure knowledge of the latest trends in the clothing and textile industry, promote the acquisition of new methods that allow students to learn about the topicalities related to the field. Expert of the Latvian Council of Science in the field of science ”Engineering and Technologies – Materials Science”. Participation in the development of modular educational programmes for professional qualifications. One of the authors of the digital teaching tool “Manufacture of sewn products”. Regular participation in international research projects. Membership in industry associations.

Aleksandrs Okss, Dr. habil. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT associate professor in the field of materials science (Textile and Clothing Technology). Academic and scientific work in the higher education institution has been performed since 1983 specialising in mechanics, and clothing and textile technology. Work experience is based on more than 50 scientific publications. The conducted courses are related to knitting technology and design and application of smart textile products. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process.

Jānis Dāboliņš, Dr. sc. ing. in computer science, RTU, FMSAC IDT assistant professor at the DDMT and researcher at RTU FIDT. Professional experience: academic work experience of 15 years in a higher education institution by specialising in assessment of training and use of applications of computer controlled design, production systems (CAD/CAM), which is attested by participation in scientific projects and research programs, participation in international scientific conferences and publications (totally nine, five of them in Scopus). Students acquire knowledge in automation of documents by using software engineering languages, reflection of production processes in graphs, data processing and data visualisation. The most recent and topical tools are integrated in the study process.

Zane Zelča, Dr. sc. ing., RTU, FMSAC IDT assistant professor and leading researcher. Dr. sc. ing. obtained in 2019 in the field of Materials Science in the sub-branch of Wood Materials and Technologies for the research “Expansion of the range of hemp-based composites and optimization of technologies”. In 2014, She won the Werner von Siemens Excellence Award in Science. Academic work experience of 5 years in a higher education institution. The conducted courses can be divided into three areas of professional competence and are related to the use of fibre materials, design and technology project management and sustainability challenges, and scientific activities (including research planning and analysis). Until 2020 she has been a co-supervisor for five Master thesis and one Bachelor thesis. Since 2020, one Ph.D thesis is being co-supervised. She has experience in developing e-commerce and marketing projects, internship in the design company Alfa LogHouses and in the pharmaceutical company Silvanols. Participation in ERDF projects, international scientific conferences, lectures delivered in design-related secondary schools and creative workshops as a guest lecturer. Expert rights of the Latvian Council of Science in the field of materials science since 2020.

Inga Dāboliņa, Dr.sc.ing, RTU, FMSAC IDT associate professor at the DCTT, laboratory manager. Participates in the provision of the study process since 2001. In 2010, she obtained a Ph.D degree in engineering. The conducted study courses are related to clothing design (Clothing Design and Clothing Design in CAD/CAM system LECTRA). I. Dāboliņa’s knowledge and experience are sufficient to achieve the results of these courses. Experience in clothing development 2D and 3D technologies has been gained since 2002. Knows several specialised 2D CAD/CAM systems for clothing design and production (Lectra, Grafis, Comtense, Vidya, Staprim) at the expert level. Since 2007 she has mastered and has gained experience working with a 3D garment fitting system. Performs experimental and practical approbation of 3D scanning system Vitus Smart XXL for study and research purposes, has a good knowledge of 3D body measurement analysis system

AnthroScan. From 2016 to 2019, she was the scientific leader and leading researcher in the project “Smart and Safe Work Wear”, one of the main tasks of which was the improvement of functional clothing. The project was implemented very successfully, which proves I. Dāboliņa’s knowledge and experience in the field of functional clothing. Regular improvement of qualification in mastering specialised systems, Erasmus+ mobility program, as well as participation in scientific conferences both with presentations and as a head of sections. I. Dāboliņa is involved in the subgroup of “Fit” group of the standardization commission for “IEEE 3D Body Processing”. Since 2020, she has been the head of the Research Laboratory of Ergonomic Electrotechnics. Expert of the Latvian Council of Science in the field of science ”Engineering and Technologies – Materials Science”.

Inese Kašurina (previously – Parkova), Dr. sc. ing., RTU FMSAC IDT lecturer at the DCTT. Doctor of Engineering Dr.sc.ing., awarded in 2014 for the Ph.D thesis “Improvement of Smart Textile Products Design Process”. Scientific experience: Author and co-author of 20 scientific research publications, 6 of which are included in recognized databases (Scopus, Web of Science, SciFinder, Ebsco). The results of the research are reflected in the collections of articles of international conferences, scientific journals and other scientific publications recognized by the Latvian Council of Science. Participation in international scientific conferences delivering oral and poster presentations. Registered Latvian patent No. 14680. “Flexible light-emitting textile display designed with floats for covering electronic devices”. As a researcher she has participated in international research projects. In 2012, she had an internship at The Swedish School of Textiles of the University of Borås as a visiting researcher working with smart textiles. Academic experience: Since 2019,(she has been)conducting a course for Master’s level students “Development of Smart Products”, as well as conducting a course "Garment Patternmaking" for Bachelor level students. Performs supervision and review of graduation papers in Master’s and Bachelor’s professional studies. In 2011, She won the Werner von Siemens Excellence Award in Science. In 2010 she was included in the RTU Golden Fund selection. Participated in professional development and training seminars. Member of the Project application evaluation committee of Knowledge and Innovation Community “Manufacturing” (EIT Manufacturing) of the European Institute of Innovation (2019, 2020).

Pēteris Kāpostiņš, Mg. art., RTU FMSAC IDT assistant professor (practical) at the DDMT. Academic work at the higher education institution (RTU) since 1996 in the specialisation of material sciences. The work experience is confirmed by more than 30 publications in scientific magazines and conference thesis. Conducted study courses are related to information technologies, graphic analysis and visualisation of items, design of products and processes in specialised CAD and CAM environment. During the period of the last 6 years he has been the supervisor of one Master thesis and a reviewer of several Bachelor and Master thesis. Practical experience in administration of servers and data bases, preparation of SQL inquiries, system analysis of new information systems, testing and organisation of security of information systems, Web site creation, use of various CAD software, visualisation of 3D scenes in various environments. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Experience in development of information technology projects - participation in three ERDF projects.

Gunta Zommere, Mg. sc. ing., RTU FMSAC IDT assistant professor (practical) and researcher at the DDMT. Academic work experience in the higher education institution since 2006, specialising in material sciences, textile and clothing technology. Conducted study courses are related to design basics and the creative process (including graphic design and design of items and collections), as well as design business basics. Regularly working as a supervisor of Bachelor and Master thesis. Practical experience and creative work in the area of graphic design (development of the graphic material design and preparation for publication), design of knitwear and clothing and production in magazines “Rīgas Modes” and “LatMode”, as well as SIA “Salons A”. Scientific activity is related to research of technologies and design of textile and clothing (functional work-wear, natural fibre

materials, the ornament of the Latvian applied textiles), which is reflected in more than 20 scientific publications. Participation in national and international research projects (*Interreg Europe*, *Erasmus+*). Attended RTU pedagogical qualification upgrading courses.

Agrita Krieviņa-Siliņa, Mg. sc. ing., assistant professor (practical) at RTU FMSAC IDT in the DDMT. Academic work experience since 1999 by performing teaching, scientific and academic work. Professional work experience since 1981 in the design field. At RTU teaches study courses related to the basics of design business, as well as the basics of design (including applied graphics and composition). Regular supervisor of graduation papers for students of the Bachelor and Master level. Participation in international scientific conferences, she is an author of several scientific publications. Participation in professional exhibitions since 1990, both group exhibitions and personal exhibitions. Since 1997 engaged in research and copies of ancient footwear at the Worldwide 3x3 gatherings of Latvians and elsewhere. The courses of production of ancient footwear have been attended by approximately 2700 interested people in Latvia, Germany, Ireland, Belgium, Australia. Since 2013 performance of ethnographic Latvian leather footwear "pastalas" and creation of a data base including the collection of the Latvian museums of regional history. Creation of illustrations for magazines "*Deko*", "*Modernists*", "*IR*", "*IR nauda*", "*IR brīvdienas*","*Creative Coast*", "*Benji Knewman*", etc. since 2012, the author of the design of several books and covers.

Jānis Kalniņš, Mg. sc. ing., lecturer and research assistant at RTU Faculty of Materials Science and Applied Chemistry IDT in the Department of Design and Materials Technologies. Professional experience: academic work experience of 13 years at a higher education institution (RTU) by conducting and delivering the following study courses related to the composition of wood products, wood design possibilities in design, wood study and wood physics, as well as design of workshops, salons and undertakings. Scientific research activity is related to the architecture of wood buildings by specialising in the architecture of wood buildings in Riga. Professional activity is related to wood processing, wood cutting, wood sculpturing, restoration of ancient furniture and shell-lacquer finish of authentic ancient furniture. The art creation is related to painting and graphic works.

Andrejs Broks, Mg. art., RTU FMSAC IDT assistant professor (practical) at the DDMT. Professional activity at the higher education institution since 2017, in the sub-field Wooden Materials and Technologies of the field of Materials Science. Since 2019, he is an expert in Vocational Education Quality Assessment in Vocational Education Institutions of the National Centre for Education. Professional activities are related to interior design, design of exhibition stands and other design products, and development and management design projects. Manager of the company "Dizains videi" (Environment Design) and designer. He is the author of many interior design projects for public buildings. Active work in public organizations, involvement in the development of design strategies and cultural policy. He has been Chairman of the Board of the Latvian Designers' Association (2012–2018), representing the association in industry-related public administration institutions, expert councils, leading the association's professional qualification certification commission, organizing professional competitions and exhibitions, as well as organizing the association's social life. He is a member of the Board of the Council of the Creative Unions of Latvia, a member of the Latvian Design Council under the Ministry of Culture of the Republic of Latvia, as well as a member of the Cultural Education Council. Participated in the development of the design structure of the design industry, product and environmental design education standards, an expert of the Arts sector Design and Creative Industries of the National Centre for Education, a member of the Cultural Education Council of the Latvian National Centre for Culture under the Ministry of Culture; A member of the Riga City Council Monuments Council, chairman of the Riga Art and Media Technical School Convent, has been a member of the industry experts council (Construction).). Developed the concept and design of the Latvian Designers' Association competition (LDS) "Design Award" and managed the project (2002–2017). Has developed and conducts study courses related

to design and branding strategies, design and technology project management, wood product composition and interior design.

Baiba Lukaševiča, Mg. sc. ing., RTU FMSAC IDT lecturer and research assistant . Academic work experience in a higher education institution since 2015, assisting and running study course lectures and practical work, as well as developing study course materials. Since 2017, more than 14 graduation papers have been supervised and co-supervised. Conducted study courses are related to the process of developing new product designs and designing industrial product collections, 3D modelling and computer-aided design methods, as well as the Basic Principles of Sustainable Design. The study process integrates a project-based learning approach, user-oriented design and creative thinking methods. The involvement of students in extracurricular projects and competitions is encouraged. Research interests are related to design education, theoretical aspects of the design development process, the specifics of teamwork and integration of sustainability issues into product design. Attends events, seminars, conferences and refresher courses related to the design and education sector for professional development. Practical experience in interior design and product design is complemented by participation in creative workshops (*Garage 48*, *Geniator XL*), involvement in IDT events and implementation of other projects. In parallel with the work with Bachelor's and Master's level students, actively participates in the preparation of and conducting classes for school students interest-related education in design and innovations implemented by RTU.

Artūrs Ķīsis, Mg .sc. ing., lecturer at RTU FMSAC IDT at the DDMT and researcher in the Materials Science sub-field Wood Materials and Technologies. Five-year professional experience in the higher education institution. Scientific and research work was performed specialising in functional design prototypes, 3D modelling of samples, simulations on CAD/CAM platforms, designing and producing prototype models from wood, wood composites, acrylates, plastics, artificial minerals and "soft" metal base materials, fittings and adhesives/finishing materials evidenced by participation in international exhibitions and scientific publications. Active practical experience of 16 years in prototype development in the wood and furniture industry. He is a member of the Latvian Wood Industry Expert Council and a member of the Latvian Furniture Exporters Association. In co-operation with the National Centre for Education, he has led seminars on practical activities "Application of hand-held electric cutting tools in the manufacture of wooden products". From 2016 to 2018, he was the author of the competition tasks developed for the woodworking industry and the nomination manager of the national skills competition for young professionals "*Skills Latvia*". In the academic work, students acquire the potentialities of using CAD/CAM platform, materials and technology, and skills in design product prototype development.

Ilze Gūtmane, Mg. sc. ing. RTU FMSAC IDT assistant and research assistant. Professional experience in academic work since 2016. Supervised and co-supervised nine and peer reviewed five Bachelor thesis. Professional activities are mainly related to product design, layout, product manufacturing and design thinking process. Scientific activity and research is based on the study of woodworking hand tools, their systematization and grouping at the level of main groups and subgroups. The performed research is reflected in scientific publications. Active participation in various events and seminars related to the design and woodworking industry. Involvement in IDT events, creative workshops, exhibitions, excursions, etc. organizing and managing events. The RTU FMSAC IDT social network administration.

Inga Zotova, Mg. sc. ing., RTU FMSAC IDT asistant and research assistant. Professional experience: in academic work since 2016. She integrated the link between the theory and practice in the study process by visiting undertakings, inviting the sector representatives, integrates the recent research and technologies from international exhibitions in lectures. In scientific activity and research, she specialises in investigation of opportunities of new materials in production of glued parts, as well as

research and development of plates made of renewable resources. The representative of IDT in the association "Latvian Furniture". Attendance of events related to the wood processing and design sector for professional improvement - seminars, improvement courses, conferences and exhibitions. Active involvement in the area of attraction of students in seminars organised by the sector, by cooperation with vocational and sector secondary schools, as well as organisation of guest lectures, excursions by presenting the work of the institute. She has been in charge for arranging several RTU IDT stands, exhibitions. Organizes and manages creative workshops, exhibitions, events. Maintenance of the social networks of the Institute of Design Technologies.

Agnese Volmāre, Mg. art., lecturer at RTU FMSAC IDT in the DDMT. A fashion designer holding the Master degree in art and design conferred by the Latvian Academy of Arts. Creative and organisational professional experience of 20 years and the knowledge in the field of fashion allows to teach professionally and creatively study courses related to the composition of clothing, design of costume collections, as well as the basics of fashion science and coloristic modeling of the environment. Conducts internships for students specializing in clothing design and technology. Academic and scientific work at RTU since 2017 by specialising in clothing design. Delivering of lectures, laboratory and practical work, preparation of the study methodological materials. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Every year she is supervising the practical part of graduation papers for the Bachelor students, as well as graduation papers of Master students. Regular improvement of skills and knowledge at courses and in practical activity, by involving in projects related to fashion, attending international events and courses of the industry. Active involvement in organisation of the annual student fashion shows "Ķīpsala Spring". A. Volmāre is assured that it is important to present fashion, therefore she views her mission as encouraging students to participate in professional competitions and improving and expanding the awareness of the study program of clothing design and technology, the study quality and the professional level of students.

Daina Šķiņķe, Mg. art., RTU FMSAC IDT assistant professor (practical) at the DDMT. Professional experience: academic work experience of 17 years in higher education institutions. Professional activities are related to the area of product design and garment design for 25 years, by continuing her professional growth in advanced education. Students master the methods of design and development of garment collections, by learning the clothing design and construction based on the visual plastic construction method developed by Skaidra Deksne, as well as implements the knowledge acquired in the study process in practice. The study process integrates the latest and current scientific research, topicalities from other countries. Regular supervisor of the project parts of the garment collections of the Bachelor students and their practical development. Active involvement in organisation of the annual student fashion shows "Ķīpsala Spring".

Ilze Balgale, Mg. sc. ing., Mg. sc. soc., RTU, FMSAC IDT assistant and research assistant at the DCTT. Academic and scientific work experience in the higher education institution since 2019, specialising in clothing and textile technology. Ph.D studies in the Ph.D study programme “Clothing and Textile Technologies” since 2020, research direction – textile sensors. Since 2019, participation in international scientific conferences and preparation of scientific publications. Conducted study courses are related to two areas of specialisation: textile technologies – yarn, fabric, knitted, non-woven fabric manufacturing technologies and equipment, textile business planning, and technical and intelligent textile development, as well as in the field of commodity science and marketing, which is ensured by the Master degree in Communication Science and professional work experience since 1999. The latest research is integrated in the conducted study courses.

Ieva Baķe, Mg. sc. ing. RTU, FMSAC IDT research assistant and teaching assistant, Ph.D student. Professional experience in the higher education institution since 2019, leading and assisting the study courses Materials Research Methodology and Customer Care. Assists in laboratory and

practical work related to materials research and testing. Peer-reviewed Bachelor thesis. Scientific activity and research is based on the modification of mixed fibre textiles with sol-gel technique. The performed research is reflected in scientific publications. Participation in various industry-related events. Involvement in the organization of IDT events and exhibitions.

Poļina Stendere, Mg. sc. ing., RTU FMSAC IDT lecturer. Teaching work experience in a higher education institution since September 2020 in the study courses "Clothing design in CAD/CAM system Lectra" and "Clothing desgin in CAD/CAM system Lectra (delivery of lectures, laboratory and practical work, preparation of study materials). The conducted study courses are related to clothing design in the system CAD Lectra. Students master the documentation development module KaledoStyle (development of technical drawings), the design module Modaris (the design system instruments, computer-aides design and construction of clothing, fitting) and the subsystem Diamino (production of location of block patterns).

Academic staff of other RTU units:

Agrita Tipāne, Dr. arch., RTU Faculty of Architecture (hereinafter referred to as FA), Department of Architecture History and Theory, assistant professor, Director of Riga Art Noveau Centre. She has provided important contribution to creation of the basis of the professional qualifications of multiple generations of architects. Successful combination of the teaching work at RTU FA and the scientific research and administrative organisational activity. She conducts the course "History of craftsmanship and art". The main area of scientific research is study of the cultural heritage, mainly the architecture of churches. The large volume monograph "Churches of Riga: Architecture and Art" (2007) is devoted to this theme and one third of the text has been prepared by her. Another joint monograph where A. Tipāne is among the main authors is "Sacral Architecture and Art Heritage in Riga" (2010). The project taken care of by A. Tipāne is Riga Art Noveau Museum which has been created and managed by her since its inauguration in 2009. Regular participation in academic conferences and seminars. Participation in international projects related to preservation of the culture heritage and Art Noveau("*Resau Art Noveau Netvork*" / "Art Noveau and ecology", "*Ruta del Modernisma*", "Preservation and restoration of culture and nature heritage"). She is the head of the national research project - travelling international exhibition "Riga Art Noveau. Architecture and Art". She has been a coordinator and organiser of several important exhibitions and events related to the history of architecture and important personalities. The author of more than 16 scientific publications.

Uģis Bratuškins, Dr. arch., RTU FA professor at the Department of Architecture Design; FA Dean; the head of the study direction "Architecture and construction", the head of the study programs "Architecture" (BA, Prof. arch., MA, Dr. arch.). He conducts the following study courses: "Architecture design", "Interior architecture" and "Landscape architecture", the lecture courses "Typology of buildings" and "Architecture morphology and research methods". Supervisor of the graduation papers of study programs. Since 2007 he has been the Dean of the RTU Faculty of Architecture (administrative obligations) and the Head of the Department of Architecture Design (supervision of the study and scientific work). Manager of several research projects and an expert in international organisations related to the architecture education and research: *Slovenian Research Agency* (since 2016); UIA/UNESCO Group of assessment and accreditation of schools of architecture (since 2013); the delegated participant of the Ministry of Education and Science of the Republic of Latvia in the work group on diplomas of architects of the European Directive "On Recognition of Professional Qualifications (since 2012). He is an expert of the Latvian Council of Science since 2011, an advisor to the Council of Preservation and Development of Riga Historical Centre, an expert of *Fondazione Romualdo Del Bianco* (Florence, Italy, since 2008). A member of editorial

boards of several scientific magazines of the sector (*Journal of Sustainable Architecture and Civil Engineering* (Kaunas: KTU, Lithuania); *Landscape Architecture and Art* (Jelgava: University of Agriculture of Latvia); *Journal of Architecture and Urbanism* (*Vilnius*: *Routledge*/VGTU, Lithuania); RTU Scientific Articles: Architecture and City Planning (Riga: DeGruyter/RTU publishing house, Latvia). She is a member and expert of several professional organisations: since 2011 a member of DOCOMOMO Latvian branch; since 2008 an expert of Fondazione Romualdo del Bianco, Florence, Italy; since 2013 the Vice-Rector of *NordicBaltic Academy of Architecture*; since 1989 a member of the Latvian Union of Architects.

Sandra Treija, Dr. arch., professor at RTU FA Department of Architecture Design. Professional experience Experience of 4 years in the position of the architect-planning expert and a project manager at the City Planning Authority of Riga City Council Department of Development. Academic work experience: Experience of 20 years holding various academic positions at RTU FA, starting from an assistance and up to the professor (since 2012), as well as administrative positions, in particular, the deputy Dean in charge of the study work (2001–2006), deputy Dean in charge of the science work (since 2007), she is the Director of the RTU City Planning Centre. Preparation and conducting of eight study courses on themes related to the city development and space environment for students of several specialities. Member of the Latvian Union of Architects and the member of the Council. An expert of the Latvian Council of Science: area of expertise - Arts and social sciences, Arts sciences, including architecture: architecture, city planning, sustainable development, city ecology, city landscape, residential environment. Coordinator of the national group of the international organisation DOCOMOMO. Professional, academic and scientific activities provide a complex view on the topical city development issues, which, in turn, provides an advantage of being able to focus on both theoretical and practical topicalities of the sector in the study process. Three Ph.D thesis supervised by S.Treija have been defended and three Ph.D thesis are under development. She has participated in international and national research projects, including the following currently implemented projects: "*Up-to Date Information Systems for Urban Regeneration*", Thailand-Latvia-Lithuania program; "*Technological Solutions for Energy Efficiency of Buildings*", the national research program; "*Cities & Rail: Increasing potentials for Smart & Just Cities*", Zviedrijas Institūts; "*BuildDigiCraft*", *Erasmus+*; "*European Middle Class Mass Housing*", *COST action CA18137*; "*Implementing Nature Based Solutions for Creating a Resourceful Circular City*", *COST action CA17133*. The research is mainly related to the issues of sustainable city development, housing issues, the quality of the living environment, urban regeneration.

Sergejs Gaidukovs, Dr. sc. ing., associated professor at RTU the FMSAC, Institute of Polymeric Materials, Department of Polymeric Materials Technology. Professional experience: academic and scientific work experience since 2010 in a higher education institution. Conducting of lectures, laboratory assignments and practical classes in the specialities of chemistry, chemistry technology material sciences, development and approbation of study materials. Supervisor of fundamental and applied research and development projects, as well as contractual research projects. Regular supervisor of the study graduation papers and Ph.D thesis. The scientific research interests are related to the polymers science: polymer chemistry, physical chemistry, technology and processing, polymeric composites, colloidal systems, soft matters, materials science and engineering. He prepares scientific publications and participates in scientific conferences on regular basis. Regular participation in *Erasmus* experience exchange of the academic staff at European universities. Regular participation in qualification improvement measures organised by RTU and other. Expert of the Latvian Council of Science in the fields of materials science, chemistry engineering and chemistry. Expert of H2020, LVS, CEN, ECHA.

Laimonis Mālers, Dr. chem., associated professor at RTU the FMSAC in the group of the professor of material sciences. Specialisation in the field "Materials Science" (polymers and composites). He

has developed study and methodological materials on adhesives and coatings, as well as ageing and protection of materials. He has totally 21 scientific publications indexed in Scopus data base and cited several times; Hirsch index 5. Academic and scientific work experience since 1994 in a higher education institution. Conducted study course: basics of material sciences. He has been a supervisor of Master and Bachelor thesis, graduation papers.

Jānis Kajaks, Dr. sc. ing., associated professor and researcher at RTU the FMSAC Institute of Polymeric Materials, Department of Polymeric Materials Technology. Professional experience: academic work experience since 1996 at the higher education institution (RTU) by delivering lectures, laboratory assignments and practical classes, as well as developing study materials in study courses "Basics of material sciences", "Wood materials", "Wood chemistry". Regular supervisor of Bachelor and Master thesis, as well as a supervisor of Ph.D thesis. He has been a manager of contracted research assignments in national and international projects, as well as an executor in research projects. He is an author of 180 scientific publications, participates in international scientific conferences on regular basis.

Anna Borisova, Dr. chem., assistant professor at RTU Faculty of Materials Science and Applied Chemistry and an expert at the Department of Polymer Materials of the Institute of Polymer Materials. Academic and scientific work in the higher education institution has been performed since 2013, specialising in materials science, polymers and composites. Work experience is based on regular scientific publications. Conducted study courses are related to production and processing, textile chemistry, finish of textile materials, printing theory and technology, dyeing and finish of textile materials. Regular supervisor of graduation papers for students of the Bachelor and Master level. Participation in national and international education and research projects. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. She has worked as a forensic expert in the Department of Document Expertise of the State Forensics Office of the Ministry of Justice of the Republic of Latvia. She has been an invited expert in the Council of Forensic Experts of the Republic of Latvia. An associate member of *Society of Dyers and Colourists* (*Bradford*, UK). She is a reviewer in the scientific journal *Coloration Technology*. The author of the RTU patent “Method of finish of textile materials of various fibre containing celluloses". Regular attendance of the RTU courses for improving the teaching qualification and other courses.

Inta Volodko, Dr. math., professor at RTU Faculty of Computer Science and Information Technologies (hereinafter referred to as FCSIT) in the Department of Engineering Mathemetics of the Institute of Applied Mathematics; head of the department. Academic and scientific work in the higher education institution has been performed since 1996, specialising in mathematics, mathematic physics. Work experience is based on more than 60 scientific publications. Regular attendance and presentation of reports at international scientific conferences. Conducted study courses are related to mathematics. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. The author of several study and methodological aids. She is the supervisor of three (3) Ph.D thesis. Regular participation in international (FP7, ESF) and national scientific and research projects. She is a member of the FCSIT Science Committee, the secretary of the RTU Council of Mathematics Professors, a member of the Council of the Institute of Applied Mathematics, a member of the FCSIT Council, a member of the RTU Constitutional Assembly, a board member at the Latvian Association of Scientists and the Latvian Mathematics Association. Regularly participates in professional development and training seminars.

Līga Ramāna, Dr. math., assistant professor at RTU FCSIT in the Department of Engineering Mathematics of the Institute of Applied Mathematics. She has been performing academic and scientific work at the higher education institution since 1989 in the field of mathematics (applied

mathematics and mathematic simulation, modern elementary mathematics). Her work exprience is attested by regular preparation and publication of scientific publications. Conducted study courses are related to mathematics. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Regularly participates in professional development and training seminars.

Larisa Iļinska, Dr. philol., RTU Faculty of E-Learning Technologies and Humanities (FELTH) professor at the Institute of Applied Linguistics; Director of the Institute of Applied Linguistics, Head of the Department of Special Use Languages. Academic and scientific work in the higher education institution has been performed since 1993, specialising in linguistics and literary studies, applied linguistics. Work experience is based on more than 55 scientific publications. Expert rights of the Latvian Council of Science in the sub-field of Linguistics and Literary Studies of the field of Humanities and Arts. The conducted study courses are related to English, French, German, Chinese and other languages and technical translation. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process. Regularly supervises graduation papers in professional Bachelor's and Master's studies. Has developed learning and methodological tools. Chairperson of the Scientific Committee of the Scientific Conference "*Meaning in Translation: Illusion of Precision*". Regularly participates and reports at international scientific conferences. She is a member of the FELTH Council and the Council of the Institute of Applied Linguistics.

Valentīna Urbāne, Dr. chem., RTU Faculty of Engineering Economics and Management (hereinafter referred to as FEEM), associated professor and researcher at the Institute of Labour Protection and Civil Defence. Academic and scientific work in the higher education institution has been performed since 1995, specialising in economics and business, business management. Work experience is based on more than 35 scientific publications. The rights of an expert of the Latvian Council of Science in the sub-branch of social and economic geography in the field of social science. Conducted courses are related to labour and environment protection. The author of several study and methodological aids. Regularly supervises graduation papers in professional engineer, Bachelor's and Master's studies. She has been presenting reports at international scientific conferences, participating in organisation commissions of conferences and leading sections. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process.

Elīna Gaile-Sarkane, Dr. oec., Bc. sc. ing., RTU FEEM professor in the Department of Innovations and Business Management, the Dean of FEEM. Professional experience: academic and scientific work experience of more than 20 years in a higher education institution. The additional Bachelor degree in chemistry industry provides excellent base for academic and research work in the fields of innovation, management and business, therefore, scientific research is targeted at inter-disciplinary fields by covering the management science, management of innovations, technology transfer and various aspects of business. More than 150 scientific publications in the fields of management, economics and other related fields. More than 35 of them are published in internationally recognised issues or conferences indexed in international data bases (for example, *Thomson & Reuter*, *Scopus*, *EBSCO*, etc.). She is the author or co-author of four textbooks, three monographs and one patent. The expert of the Council of Science of Latvia. Expert, researcher or project manager in totally more than 20 projects, by promoting inter-disciplinary, international cooperation by important contribution to improvement of the education system of Latvia. Conducted courses are related to development of innovative products and business. The latest findings and the most relevant scientific research in the mentioned field are integrated in the study process.

Jeļena Malahova, Dr. oec., associated professor at RTU FEEM Institute of Labour Protection and

Civil Defence (ILPCD). Professional experience: since 2011 the deputy Director of RTU FEEM ILPCD in study matters, and since 2014 associated professor of FEEM ILPCD. Research components in work with students are provided by active participation in seminars of qualification improvement, participation in scientific conferences and development of publications. Active involvement in various projects and contracted scientific assignments. Within the study process, students acquire topical information in compliance with Cabinet Regulations of the Republic of Latvia No. 716 “Minimum Requirements for the Content of the Mandatory Course in Civil Protection and the Content of Training of Employees in Civil Protection”. Expert of the Latvian Council of Science in the science field of social sciences- economics and business.

Gunārs Ozolzīle, Dr. sc. soc., associated professor at RTU FELTH Institute of Humanities, the Department of Sociology and Pedagogy, head of the department. Professional experience: teaching of social sciences (sociology, politology and the Latvian political system) at RTU and other higher education institutions of Latvia since 1989; the chairman of the State Examination Commission of the Faculty of Economics and Society Development of the Academy of Agriculture of Latvia in the Bachelor and Master study program "Sociology of organisations and society governance” (as from 2005). Researcher at the market and public opinion research firm (SIA) Baltic Study Centre (1991–2018). The research link with students is also provided by the scientific research work, in projects funded by the Ministry of Defence of the Republic of Latvia and EU, participation in conferences and development of scientific publications. Scientific research activity is mainly related to the investigation of the stability and efficiency of the Latvian political system and the possibilities of reforming individual political institutes. This research direction allows improving the quality of the conducted study courses and providing the link with the current political processes in the country. The regular methodological work, in particular, development of study aids and other methodological materials, also helps improving efficiency of the study work.

Aleksejs Šņitņikovs, Dr.sc.soc., assistant professor at RTU FELTH Institute of Humanities, the Department of Sociology and Pedagogy. He conducts the study courses "Unified Europe and Latvia" and "Management sociology”. He has obtained extensive professional experience in the field of sociological research by working at the Institute of Philosophy and Sociology of the University of Latv years), by participating in both fundamental and business projects. He has obtained research experience in the field of consultation by cooperating with private research companies (“SAFEGE Baltija” Ltd), including in policy assessment projects, by assessing the state administration policy and efficiency of use of EU funds. In the process of development of his Ph.D thesis, he has had internship at Copenhagen Business School (2010–2011), maintains professional contact with this higher education institution, in 2018 and 2019. He has been at Copenhagen Business School within the framework of *Erasmus* mobility program. His research interests are related to sociology of organisations, research results are used in development and implementation of the course.

Aleksandrs Beznosiks, Mg. art., lecturer at RTU FA in the Department of Fine Arts. Working as a designer in development of design projects and supervision of their implementation. He conducts the study course "Basics of fine arts". He has participated in the role of a designer and an implementation supervisor in implementation of several interior and architecture projects (“Project of reconstruction of the premises of the museum of the RTU Faculty of Electronics and Telecommunications and Implementation Supervision”, “Project of the memorial exposition of the Archbishop Jānis Gerklavs and Senior Priest Sergejs Garklāvs”, “Project of improvement of the entrance hall of the RTU Faculty of Electronics and Telecommunications"). He has regularly participated in exhibitions with his creative works (2003–2015), he has had several publications of creative works in the interior magazine Deko (2003–2008). He has received several awards for developed graphic design works (development of logotypes).

Sandra Gudzuka, Mg. psych., assistant professor (practical) at RTU FELTH in the Department of

Engineering Pedagogy and Psychology. Academic and scientific work in the higher education institution has been performed since 1994, specialising in psychology. Conducted courses are related to communication, social and organisations psychology. She conducts various professional improvement courses and supervisions. Certified advising psychologist and psychologist-supervisor. She has participated in development of several study and methodological aids, the work experience is confirmed by scientific publications. Research activity and scientific interests are related to theories of organisations, the education institution as an organisation. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the 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 may be additionally specified (if applicable).

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).

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

For the scientific research activity, the Institute of Design Technologies (IDT), including the Department of Design and Materials Technologies (DDMT) has established and introduced the infrastructure and management, it is well considered and efficiently promotes achievement of the goals and objectives of the study program "Material Technology and Design", as well as international recognition in the directions of the scientific research of DDMT.

The academic staff is actively involved in scientific research in the sub-branches "Wood materials and technologies" and "Textile and clothing technologies" of the field of Materials sciences, by performing research in the scientific directions of IDT:

- research of wood and wood based materials and structures, development of innovative solutions;
- creation of the knowledge base of wood processing tools, machinery, historical wood construction and terminology;

- design of sustainable products with a high added value of wood and other renewable resources and their processing waste, development and optimisation of manufacturing technologies;
- development of coatings containing modifications of fibre textiles and solid surfaces (synthetic polymers of a wood plate), bioactive and other functional substances and nano-webs.

Scientific research

During the accreditation period, the academic staff and Ph.D students of DDMT have performed research within both international and national projects, for example:

- Inter-regional cooperation program INTERREG, European Union Structural Funds Objective 3 of "European Territorial Cooperation" programme international research project "Smart and Safe Work Wear", RTU project scientific supervisor I.Dāboliņa, involved academic staff I.Baltiņa, G.Zommere, J. Dāboliņš (01.03.2016 – 01.03.2019);
- Projects of the European Regional Development Fund:
    - "Synthesis of nano-level modified textile surface coatings and integration of energy independent measuring system in smart clothing with medical observation functions", scientific supervisor S. Kukle, involved academic staff: I. Baltiņa, B. Lukaševiča, Z. Zelča, I.Baķe (01.03.2017 – 31.12.2019);
    - "Structures and technology development of smart insulation materials for indoor microclimate regulation", scientific supervisor S. Kukle, implemented by E. Kirilovs and I. Zotova (16.10.2017 – 15.10.2020);
- European Social Fund program "Human Resources and Employment", Activity 1.1.1.2 "Attracting human resources to science" project "Development of the innovative technologies for the accumulation and production of heat and cold", scientific supervisor S.Kukle, implemented by D.Beļakova, E. Kirilovs, I. Kašurina, Z. Zelča (01.12.2013–31.08.2015);
- *Erasmus+* Key Action 2 (KA2) strategic partnership projects:
    - "Circular Economy Innovative Skills in the Textile Sector, ECO – TEX", RTU project supervisor D.Beļakova, involved academic staff G. Terļecka, G. Zommere I. Dāboliņa, I.Ziemele (01.11.2017 – 30.04.2020);
    - "Innovative design practice for development of a new, circular textile industry sector, Design4Circle", RTU project supervisor D.Beļakova, involved academic staff G. Terļecka, G. Zommere, I. Dāboliņa, A.Ulme, I.Baltiņa (01.12.2018 – 28.02.2021);
- Project of the Latvian Council of Science "Research of the properties of Latvian renewable raw materials - lax and hemp, their application for development of innovative technologies and new functional materials", implemented by S. Kukle, I. Baltiņa, D. Beļakova, I. Ziemele, A. Ulme, G. Zommere (01.01.2010 – 31.12.2013);
- RTU research project "Humidity absorption properties of hardwood veneer produced by Sol-Gel process", the project supervisor E.Kirilovs, involved staff I.Zotova (01.05.2016 – 30.04.2017);
- Operational programme "Growth and Employment" 1.1.1. Specific support target "Improve the research and innovation capacity of Latvian research institutions and the ability to attract external funding by investing in human resources and infrastructure" 1.1.1.1. Measure "Practical Research" the project of the 1st stage "Synthesis of textile surface coatings modified in nano-level and energy-independent measurement system integration in smart clothing with functions of medical monitoring", project scientific supervisor S.Kukle, involved

academic staff I. Baltiņa, U. Briedis, B. Lukaševiča, Z. Zelča, I. Baķe, I.Balgale (01.03.2017 – 31.12.2019).

Within the framework of the ESF funded project "Strengthening of Academic Staff of Riga Technical University in Strategic specialisation Areas" in academic years 2019 –2020 and 2020–2021, assistant professor G.Terļecka had working internship in the company SRC Brasa, assistant professor Z.Zelča - in the company "Silvanols", the assoc. prof. A.Ulme - in "Royal Design Generation" Ltd, and lecturers J.Kalniņš - "KOSTERS" Ltd, and A.Ķīsis - "INSTRO" Ltd. 05.11.-09.11.2018 A.Ķīsis has also had internship in Finland at SASKY Municipality Education and Training Consortium, Ikaalinen Design and Crafts College (IKATA).

Research promotes development of the study program by incorporating achieved results in the content of study courses, the theory base of study courses, the diversity of methods of research are supplemented, and the integration of research results in product/ collection solutions is promoted, like:

- production of new/ improved materials, supplementing of properties and their inclusion in untraditional solutions;
- use of diverse structures and joints;
- use of sustainable products or utilised materials;
- construction and cutting with no waste, reducing the consumption of materials;
- improved ergonomic aspects of products/ collections;
- choice of optimum technological operations.

The solutions developed by students within the study program can often be continued by performing in-depth investigation and improvements in the Master and Ph.D program under supervision of the IDT academic staff. The link of the product development with scientific research allows obtaining competitive and innovative design solutions which are important on the level of both science and the design sector .

By promoting the professional growth, the **results of the scientific research projects** performed during the report period are presented in a scientific monograph and three sections of scientific monographs, 7 national, 10 inter-country and 25 international conferences, reflected in 53 scientific publications in collections of conference articles, 21 publication in international scientific journals, as well as 16 publications in the RTU scientific journal and 42 thesis in collections of conference thesis. During the time period from academic year 2013 to 2020, the assistant professors, Ph.D students and involved Master students of DDMT have been authors/ co-authors of 249 scientific publications. The obtained summarised know-how is also reflected in methodological publications and books (see Section 3.1).

Within the research process cooperation with other research institutions and their leading researchers, laboratories and undertakings has been encouraged, which are open for further cooperation in the field of research, and present the operation specifics to students during excursions, thus linking the theory process of studies with its implementation in the industry practice. The list of cooperation agreements is attached in Annex 9 of the Study Direction.

Participation of assistant professors in conferences allows establishing new contacts, getting acquainted with the recent research in own research directions and side areas, to gain inspiration for new research directions or improvement of the current ones, improving presentation skills, expanding the know-how regarding topical research, extending the range of research methods,

improving knowledge of foreign languages, supplementing the sector terminology and incorporating the obtained knowledge in the content of conducted study courses, supervised study/ Bachelor and Master thesis (see the summary of topics of the Master thesis of the 2nd year students of the study program "Materials Technologies and Design" 2013-2020 in Annex 4.5.1) and in Ph.D thesis. During the accreditation period, six Ph.D thesis (Dr. sc. ing.) under the scientific supervision by assistant professors of DDMT have been successfully developed and defended, their authors have graduated from the Bachelor study program "Material Technologies and Design", four of the authors have joined the team of assistant professors of DDMT; nine Ph.D thesis under the scientific supervision by assistant professors of DDMT are being developed. In the process of development of five defended Ph.D thesis foreign research structures and advisers were involved: PhD L. Freivalde performed a part of the experiments of her Ph.D thesis in the Technical Textiles Centre of Leeds University (UK) under the supervision by the professor S. Russell; PhD S. Vihodceva worked at the Research Institute of Natural Fibre and Medical Plants in Poznan (Poland) under supervision by PhD M. Zimnievska; PhD E. Kirilovs worked in Leibniz Institute for Agricultural Engineering and Bioeconomy (Potsdam, Germany) under supervision by Dr. rer. agr. H. J. Gusovius; PhD I. Gudro at Kaunas University of Technology of Department of Polymer Chemistry and Technology (Lithuania) under supervision by the professor Dr. V. Valeika; and PhD A. Putniņa performed a part of experiments at the Latvian Institute of Wood Chemistry under supervision by Dr. chem. J. Grāvītis. Cooperation with leading foreign universities and research institutes (see cooperation partners in Annex 14 to Section II) allows provision of both a unique experimental base, and scientific and methodological expert examination, preparation of joint publications. For Ph.D thesis “Extension of the Range of textile Modified at Nano-level” its author Dr. sc. ing. Svetlana Vihodceva was awarded the Latvian Academy of Science Young Scientist Award by the Latvian Academy of Sciences in 2015.

Along with scientific supervision of Master and Ph.D thesis, the academic staff and personnel of DDMT provide necessary consultations for working in research laboratories within the process of development of the solution of the selected research theme, Ph.D students are involved in the process of study courses, advise and supervise development of Bachelor thesis and actively participate in improvement of the methodological provision of study courses and practice. The academic staff of IDT work as **experts** the promotional councils in Latvia and abroad. For example, D. Beļakova, E. Kirilovs and S. Kukle are experts of the Latvian Council of Science, and members of the RTU promotion council P-11 during the accreditation period, G. Zommere is the scientific secretary of promotion council P-11. S.Kukle has also been a member of the promotion council/ expert at Kaunas University of Technologies (4 Ph.D councils) and Tallinn University of Technologies (1 council), as well as the member of the Scientific and Program committees of the International Textile, Clothing & Design Conference (ITC&DC) “Magic World of Textiles” (Croatia) in 2014 and 2016 and a reviewer of articles of international journals and conferences. In 2019 A. Ulme was a member of the organisational committee of the International Scientific and Practical Conference) “Architecture and art: from theory to practice” (Rostov-on-Don, Russian Federation). I. Gudro has been a member of the editorial board of the journal *H*istory of Engineering Sciences and Institutions of Higher Education) since 2017.

Artistic innovation

Considering the direction of operation of the IDT and the study program in the artistic innovation, the academic staff **actively participates in competitions, exhibitions, create personal exhibition and transfer this experience to the study process**, resulting in students also receiving awards in competitions and exhibitions, positive references and publicity. The summary of involvement of the academic staff of DDMT in artistic innovation is attached in Annex 4.5.2.

Participation in competitions by the academic staff develops professional competences related to compliance with the requirements of the competition regulations, preparation of the application documents, organisational work and development of the offer. Successful participation in competitions promotes the recognition of the personnel and proves competence in the particular field. Achievements of the academic staff serve as the additional motivating factor for applicants when they choose the study program, encourages to study under supervision by professionals. Obtained experience is integrated in the study process, providing knowledge regarding the preparation processes, study, application, time management, development of projects for competitions and other important aspects that provide know-how to the future product designers and graduates of the study program and promote competitiveness in the industry competitions. This knowledge is integrated in the study process by using various methods of play, simulating the competition process, assessment according to the criteria, analysing the performance from various angles. Students have an opportunity to practically involve in arrangement of competitions, to understand processes related to preparation of documents, submission of applications, the organisational aspects and presentation of a product according to the environment and use, as well as to participate in various competitions during the study period, where the academic staff can act as mentors, promoting the student's success at the competition.

The participation in competitions, exhibitions by the academic staff and the obtained experience and competence can also be justified by gained success in supervision of graduation papers in the study program. The authors of supervised thesis participate in both national and international exhibitions and competitions in several categories and gain success: design of items, environment design, design research, where they receive awards, thus promoting recognition of graduates on the labour market and in the industry. Under the supervision by the academic staff and with their participation environment items have been developed and are demonstrated in public, also students of the program are involved in these processes for linking the theoretical knowledge with the industry and practical work. Interior design solutions in the RTU student campus have been developed and implemented under the supervision of the academic staff.

The academic staff organises and supervises development of exhibitions and expositions of the RTU Institute of Design Technologies for events, like "Design Code", "Design Island" and "RTU Fashion Show", they arrange creative workshops and organise and supervise charity events in relation to design.

The academic staff **creates also personal exhibitions and participates in exhibitions** by demonstrating created works in public places or at international exhibitions. Exhibitions are related to the product design, materials sciences, crafts, painting, applied arts, photography and other art innovation areas, revealing the author's skills and competence in the selected area.

The academic staff regularly participates in **professional improvement and training seminars,** by supplementing existing knowledge and gaining new knowledge. Participation of teaching staff in training and professional development courses see in Figure 4.1.

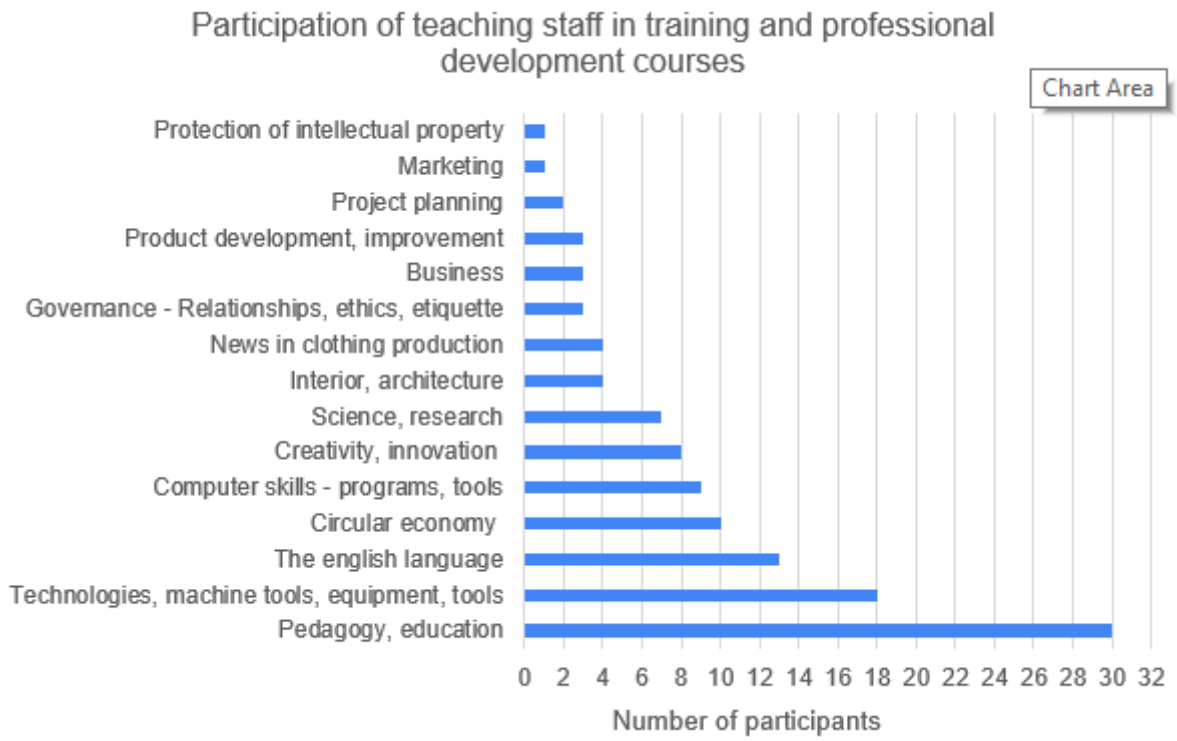


Figure 4.1. Participation of teaching staff in training and professional development courses

A part of the academic staff implement their art innovations as **self-employed or managers of own companies**, therefore they can share their current experience with students regarding starting and managing of business. This knowledge is applied in the study process both in lecture courses, in study projects and development of graduation papers. The academic staff, based on their experience and contacts, advise students to participate in various hackathones, incubators, business accelerators, as well as additional study training courses where additional business aspects are taught. In the result, students' participation in the projects offered by the RTU Design Factory has increased in order to develop and test early business ideas prior to starting independent business, as well as they create teams and develop successful product offers by applying in-depth knowledge, followed by establishment of new undertakings during studies or shortly after graduation.

During the study semester, the personnel regularly organises and goes on excursions with colleagues and students to **scientific institutions, production and design undertakings**, where they get acquainted with the organisation, operational specifics, gain in-depth understanding of products and production processes, also get practically involved in testing and use of products, constructions and technologies. Every year there are study trips to furniture design and wood processing, clothing design and production, construction and finish undertakings, undertakings related to the direction of sustainability and processing, interior salons, museums and other inter-disciplinary undertakings.

The academic staff also uses **mobility** possibilities abroad for obtaining experience, thus gaining new knowledge and skills at both education and research institutions, and production undertakings, and international industry events.

During the report period, the academic staff actively organised and managed various **creative and educating workshops and seminars** (see Annex 4.5.3). Students have an opportunity to get involved in their preparation processes for gaining and expanding their experience. Such activities are integrated in the study content or offered outside the study time, using and developing

organisational, coordination and management skills.

The personnel of DDMT participates in organisation of the RTU **international summer schools** by developing their concepts and implementing organisational, content development and teaching duties. Two international summer schools have been implemented during the report period: "*A Journey Beyond the Traditional Wooden Craft and Art*" in 2016 "*Woodcraft and Ar*t" in 2017 with participants from more than 10 global countries.

The staff **participates also in workshops and seminars organised by others**, thus expanding and updating their knowledge, skills and competences. They also attend various theoretical and practical seminars, master classes and guest lectures organised by various undertakings, thus gaining new knowledge and practical skills in use of tools and machinery, new technologies of the industry, product design, interior, eduction, sustainability, production, product development and other aspects.

Considering the specifics of conducted courses, the academic staff attends international, regional and national exhibitions of the relevant field, thus getting acquainted with the current trends and finding of the industry, innovative solutions, gaining inspiration for development of new concepts. Availability of a broad range of exhibitions both in Latvia and abroad allows regular upgrading of the professional abilities and transferring it to study courses, as well as establishing contacts with producers/ distributors of materials, fittings and technological equipment, to get acquainted with the performance, applied methods of other Latvian and foreign education institutions, possibilities offered by the modern technologies and other aspects for development and implementation of the modern study environment, content and form.

4.6. 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 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 structure, content and mutual links of the study courses have been developed in compliance with the goal of the study program and the standard of a product designer, therefore, it is sequential, logic and interlinked, providing acquisition and supplementation of theoretical and practical knowledge, skills and competences. Theoretical study courses are most often linked to practical or laboratory assignments to strengthen and supplement the acquired knowledge. Also the study courses to be completed in sequence are mutually linked to prevent overlapping of the content and to minimise the possibility that there are any omitted topics. The link is formed by the content to be acquired and the assignments to be completed by a student.

The progress of the interlinked study courses and the achieved learning outcomes are assessed and analysed, new links are planned and existing links of study courses are improved in compliance with the goals and objectives of the study program and study courses at the meetings of the Department of Design and Materials Technology. The results of students' surveys every semester within the RTU study program and relevant study courses help to carry out objective assessment of the outcomes, considering students' opinion, assessment and recommendations. Regular mutual communication among the academic staff at both meetings and individually, allow assessing efficiency of cooperation and improving it also during the semester, based on the students' performance indicators are interim tests, for example, results of tests, practical assignments,

laboratory assignments.

In order to promote improvement of the academic staff, the RTU system offers professional improvement seminars for improvement of the teaching methodological competences, organises annual RTU methodological conferences (in Latvian: https://estudijas.rtu.lv/course/view.php?id=57106), and the academic staff regularly attends professional competence improvement seminars and courses both in RTU and externally, as well as visit the sector undertakings jointly with students, thus achieving even closer links both within study courses and with the industry.

The ratio between the numbers of students (159) and the academic staff (46) was 3,5:1 in December 2020 in the professional Bachelor study program "Material Technology and Design". This ratio ensures sufficient individual communication between the academic staff and students resulting in efficient and targeted study work. It should also be taken into account that the actual ratio is higher, because a part of the academic staff is employed in several study programs and the relevant study courses are implemented in groups by merging minimum two study programs.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	5.pielikums_Statistikas_dati_par_studejosajiem_ANNEX_5_Statistics_on_students.pdf	5.pielikums_Statistikas_dati_par_studejosajiem_ANNEX_5_Statistics_on_students.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	Annex_6_Compliance of the Study Programme with the with the State Education Standard.pdf	6. pielikums Atbilstība valsts izglītības standartam.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)	7. pielikums_Atbilstiba_profesijas_standartam_ANNEX_7_Compliance with professional standard.pdf	7. pielikums_Atbilstiba_profesijas_standartam_ANNEX_7_Compliance with professional standard.pdf
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_8_Mapping_of_the_study_courses.pdf	8.pielikums_Studiju_kursu_kartejums_RWCH0.pdf
Curriculum of the study programme (for each type and form of the implementation of the study programme)	9. pielikums_Studiju_programmas_plans_ANNEX_9_Study_program_plan.pdf	9. pielikums_Studiju_programmas_plans_ANNEX_9_Study_program_plan.pdf
Descriptions of the study courses/ modules	RWCH0_EN_studiju_kursi_2021.zip	RWCH0_LV_studiju_kursi_2021.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	11_pielikums_Diploma_un_pielikuma_paraugs_ANNEX_11_Sample_of_the_diploma_and_diploma_supplement.pdf	11_pielikums_Diploma_un_pielikuma_paraugs_ANNEX_11_Sample_of_the_diploma_and_diploma_supplement.pdf
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Vienosanas_ar_LLU_01000-4.1-e_53.edoc	Vienosanas_ar_LLU_01000-4.1-e_53.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	Par_zaudējumu_kompensāciju.edoc	Par_zaudējumu_kompensāciju.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.		
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education		
Sample (or samples) of the study agreement	Studiju_liguma_paraugs.zip	Studiju_liguma_paraugs.zip
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.		

Design Engineering (47548)

Study field	*Manufacture and Processing*
ProcedureStudyProgram.Name	*Design Engineering*
Education classification code	*47548*
Type of the study programme	*Professional master study programme*
Name of the study programme director	*Dana*
Surname of the study programme director	*Beļakova*
E-mail of the study programme director	*dana.belakova@rtu.lv*
Title of the study programme director	*Inženierzinātņu doktora grāds*
Phone of the study programme director	*+37126356510*
Goal of the study programme	*To provide and develop students' professional, creative, and research competencies:* *- in the field of textile and clothing design and production, by training specialists who ensure the company's order fulfillment, their execution process, and employee management, effective development, implementation, and management of new technologies, methodologies, and systems, as well as improvement and expanding the understanding of professional ethics and socially responsible management* *or* *- to prepare specialists in the field of design for work in the field of indoor and outdoor product development in accordance with the ergonomic and technological solutions of their design usability, using appropriate raw materials (wood, metal, textiles, etc.), the respective processing technologies and their knowledge and skills of application of the implementation systems.*
Tasks of the study programme	*- To prepare LQF level 7 specialists in the field of clothing and textile production technology who either individually or leading a team or several teams in a parallel plan, organize and manage product production processes, accounting and logistics. Working in a team, develop the company's quality management system. By systematically analyzing information on the development trends and standards of the textile industry and integrating knowledge from different fields, design and implement a new design, modeling, technological process improvement, and/or design technologies, concepts, methods, and/or experimental models. Work on the introduction of new products into production. Define the principles of working time standardization in production, develop and implement company-level standards, analyse manufacturing productivity and manage the implementation of changes in work efficiency. Understand and drive the development of textile industries and related areas;* *- To prepare LQF level 7 design specialists who create new products and manage product development projects in accordance with environmental, communication, and/or service design projects; analyze the needs, problems, habits, etc. of the target audience (user); develop a methodological framework for testing, check the compliance of products and materials with regulatory enactments, prepare a technical project, perform author supervision, presentation and marketing of a product and/or service. Specializations according to the needs of industries.*

Results of the study programme	*Knowledge:* *- Will be able to demonstrate basic and specialized knowledge relevant to the design specialization or the specialization of clothing and textile production technologies. Will be familiar with the methods of research planning, processing, and interpretation of results, able to perform comparative analysis and assess compliance with the problem to be solved, understanding the need to ensure the reliability of the data obtained and being able to provide it for research in the field related to the specialization* *- Will be able to understand the most important concepts and regularities, will be able to perform the integration of knowledge and research results, critical analysis.* *- Will be able to know and follow the highest level of achievement in the profession and specialization in relevant fields of science and research.* *Skills:* *- Will be able to independently structure their learning, promote their own and subordinates' further learning and professional development, find and implement a scientific approach to problem-solving, take responsibility and initiative, working individually, in a team or leading other people's work, make decisions and find creative solutions in changing or unclear conditions.* *- Will be able to develop conceptual solutions for the spatial environment, products and/or collections thereof according to consumer needs and project/market requirements, demonstrate the conceptual solution through preliminary design, mock-ups/prototypes; create 3-D visualizations in digital environments, as well as train others to use them.* *- Will be able to use information technologies, advanced design technologies – general purpose and specialized automated design systems, automated design and production control systems, CNC machines, general-purpose and specialized databases in the design process.* *- Will be able to manage product, collection, long-term and short-term brand development, administer contracts, perform authors supervision in project execution, use industry terminology in the official language, use industry standards and technical regulations, comply with the laws and regulations of the Republic of Latvia and cross-border partners, industry-related regulations and regulatory documents; adhere to the professional and general ethical principles.* *- Will be able to coordinate the work outcomes with clients, cooperation partners and necessary institutions; plan the necessary research, analyze and design product promotion campaign, organize orders delivery to customers, organize and perform quality management of order fulfilment, draw up business documents in conformity with the requirements of record-keeping regulatory enactments.* *- Will be able to conduct professional training in the field corresponding to the specialization; work individually, in a team, plan and manage their work, the work of workgroup or other employees.* *Competencies (analysis, synthesis and evaluation):* *- Will be able to use the acquired theoretical basis and skills, perform professional, innovative and research activities, formulate and analytically describe information, plan and perform the research necessary for problem identification and solution finding in the related science field and profession, explain the results, carry on a reasoned discussion about them with specialists and scientists, as well as with non-specialists, be able to design and manage research projects/programmes.* *- Will be able to analyse and forecast scientific and technological development trends, assess their impact on the competitors' products, as well as aesthetic, material, functional, ergonomic and economic qualities of the products/collections to be developed.* *- Will be able to understand and analyse the possibilities of replacing non-renewable resources with regularly renewable ones, develop environmentally-friendly solutions, integrate good design principles and find economic solutions throughout the life cycle of the product from extraction of raw materials, production of materials and consumption to product disposal/recycling.* *- Will be able to understand, analyse and synthesize material combinations, ensuring the compatibility of their properties, uninterrupted service time, analyse industry-leading technologies, follow the development and trends of new technologies, understand the interconnected work processes, think creatively and comprehensively analytically (holistically), independently accept decisions corresponding to their level of competence and take responsibility for them.*
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)	*- Professional Bachelor`s degree in Clothing and Textile Technology and Engineer qualification in Clothing and textile production or equivalent education; or - Professional Bachelor`s degree in Materials Technology and Design and Product Designer qualification or equivalent education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master's Degree in Design Engineering*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Riga Technical University	RĪGA	KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050

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)	*Professional Bachelor`s degree in Clothing and Textile Technology and Engineer qualification in Clothing and textile production or equivalent education. or - Professional Bachelor`s degree in Material Technology and Design and Product Designer qualification or equivalent education.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master's Degree in Design Engineering*
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Riga Technical University	RĪGA	KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050

III - DESCRIPTION OF THE STUDY PROGRAMME (1. Indicators Describing the Study Programme)

1.1. Description and analysis of changes in study programme parameters that have taken place since the issue of the previous accreditation certificate of study direction or the license of study programme if study programme is not included in the accreditation page of the study direction

In the period from the academic year 2013/2014 until 2019/2020 two professional Master's study programmes Material Design and Technology and Clothing and Textile Technology were implemented at the Institute of Design Technologies (hereinafter – IDT), which were accredited for six years in the accreditation process in 2013. Following the industry requirements and the latest technologies changes have been made several times in the content of both study programmes.

In response to the demand, changes in the industry, the provision of education services and the requirements for training of new specialists, in 2019 it was decided to create a new, modern Master's professional study programme that would meet the requirements of the industry. The aspect of optimization of the process – efficient use of intellectual, material, technological and research resources – was as important.

In 2019, within the framework of the *SAM* project (Reducing fragmentation of study programs at Riga Technical University and strengthening resource sharing, No. 8.2.1.0/18/A/013), the development of the professional Master's study programme "Design Engineering" was launched on the basis of two professional Master's study programmes which are still being implemented – "Clothing and Textile Technology", (Latvian education classification code: 47542) and "Material Design and Technology" (Latvian education classification code: 47548). *According to the decision of the Ministry of Education Study Quality Commission of April 14, 2020, the study programme No. 2020/15-L was licensed and license No. 04051-169 was obtained.* The line of work of the specialists to be prepared in the new professional Master's study programme corresponds to the priority direction of Latvia's strategic specialization in science – *Technology, materials and engineering systems to increase the added value of products and processes and cybersecurity.*

New technologies, new raw materials and stricter sustainability/environmental regulations (REACH) are entering companies in the sector covering all product types, and are binding and mandatory for industries, the textile industry (as the second largest polluter) in particular. This also requires new competencies of designers and constructors, as well as technologist skills, competencies and attitudes to orientate themselves and manage the most recent technological processes. In response to these significant changes in the new programme, study courses were introduced that would allow new specialists not only to be knowledgeable in the latest technologies of the industry but also to significantly improve their knowledge in solving sustainability/environmental issues. Before starting the development of the content of the study courses, face-to-face meetings with industry experts were organized to analyse the information collected on the learning outcomes to be achieved in the study programme to be developed and to make corrections and clarifications in the created units of the learning outcomes to be achieved.

The development of the study programme "Design Engineering" was based on the current events in the industry and the surveys of industry operators as well as former and current students. The surveys revealed significant and consistent suggestions and weaknesses in the competencies of

graduates in all groups of respondents. The indications obtained in the surveys regarding the knowledge necessary for the graduates in the activities of companies in relation to creative thinking and creative decision-making in practice, creative project management, and work with special production equipment and new, intelligent technologies were taken into account. Significant emphasis should be placed on the in-depth acquisition of theoretical knowledge in close connection with practical skills. Current needs stem from the rapid growth of industries in the application of technologies and the needs of entrepreneurs for professionals who have acquired practical skills to be applied in production immediately.

The majority of the leading and also new academic staff of IDT were involved in the working group for the development of the study programme Design Engineering. Considering the connection of the study programme with the creative industries, the involvement of the new academic staff in its development was very important in creating an interesting study content that is attractive to young people. The study programme development workgroup initially performed the identification and specification of competencies required in the professions of product designers, clothing and textile production engineers, analyzing professional standards, industry required skills for qualification Level 7 for young professionals in Europe and the worldwide, determining Master's level competencies for each specialization.

The selected topical competencies to be acquired at the Master's level were analysed in a workgroup together with the academic staff of the field and IDT-friendly partner universities, determining and selecting the common competencies for the specializations to be included in the study programme. This allowed defining common results to be achieved by the general education part of the study programme and to plan the units to be created for the compulsory part of programme A (future study courses), their thematic modules. The subgroups of experts attached to the specializations performed the "mapping" of the specified desired learning outcomes of the current study courses and previously identified industry topical skills of LQF level 7 specialists, determining the study courses to be taken directly from the study programmes to be enclosed, the study courses to be improved and the new units of achievable learning outcomes to be formed from the remaining skills, from which the study programme A – units of the achievable outcomes of the compulsory part and B – units of the achievable outcomes of the restricted elective part were separated.

In the process of careful analysis, the units of the study programme B – restricted elective parts were merged into parts of the study programme corresponding to the specializations, providing different competencies training for the students according to the specialization-characteristic raw materials (wood, textile) and/or design process (clothing design, wood products or interior design). Thus, the units of results to be achieved in Part B were repeatedly concretized and B – restricted choice study courses were created. Also, from the compulsory part units of study programme A, the study courses of the compulsory study programme were formed.

The newly created professional Master's study programme "Design Engineering" actually combines the professional Master's study programmes "Clothing and Textile Technology" (RTU code: WGV0) and "Materials Design and Technology" (RTU code: WGD0) implemented by IDT in the reporting period, at the same time significantly supplementing and arranging the content of the achievable learning outcomes at the level of Master's study programme in accordance with the current requirements in the relevant sectors and society as a whole. As a result, the number of study programmes decreased (from two to one) and the efficiency of the use of intellectual, material, technological and research resources increased.

1.2. Analysis and assessment of the 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 in the different study forms, types, and languages.

Statistical data on students in the programme are provided for the two professional Master's study programmes in "Clothing and Textile Technology" and "Material Design and Technology" implemented in the reporting period. Both study programmes were implemented as full-time studies in Latvian. Also, statistical data show the enrolment data for the 2020/2021 study year in the new professional Master's study programme "Design Engineering". The data are attached in Annex 1.

During the reporting period, 300 students studied in the professional study programme "Material Design and Technology", while 146 students studied in the programme "Clothing and Textile Technology".

The total number of students in master's study programs has decreased, from 67 (in 2013/2014) to 39 (in 2019/2020). In the academic year 2013/2014 a total of 22 students studied in the professional Master's study programme "Clothing and Textile Technology", while in the academic year 2019/2020 – 13 students. As for the programme "Material Design and Technology", 45 students studied in the academic year 2013/2014, but at the beginning of the academic year 2019/2020 – 26 students.

In recent years a decrease in the number of students has been observed, which is related to the changes in the demand of the modern labour market, the demographic situation in Latvia, as well as the decrease in the number of budget places. Students already acquire sufficient knowledge in Bachelor studies to successfully present themselves in the labour market.

Every academic year, there is a drop-out of students. The main reasons for dropping out are the exmatriculation of students for failure and leaving of one's own choice. Fewer are exmatriculated for not starting studies after academic leave and exmatriculated due to not starting studies after matriculation. This can be explained by the fact that the majority of students entering Master's studies are working, which causes difficulties in the study process. Not everyone manages to combine employment with studies and students choose to drop out of Master's studies. In fact, those who want to continue their studies in research and after completing the Master's programme study for a doctorate, remain to study for a Master's degree.

Initially, 16 people applied for studies in the new professional Master's study programme "Design Engineering", however, only 11 people started their studies. The programme is new and the first admission took place in the summer of 2020. The feedback from students is generally positive, which suggests that a larger number of people will apply for admission to the Professional Master's study programme "Design Engineering" next time. The programme is planned to be implemented as full-time studies in two languages – Latvian and English. In the academic year 2020/2021 no students were admitted to study in English.

Statistical data on the dynamics of the number of students, the number of graduates, as well as the drop-out rate of students and the reasons for it in the reporting period is attached in Annex 1.

1.3. Analysis and assessment of the interrelation between the name of the study programme, the degree or professional qualification to be acquired or the degree and

professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements.

Design Engineering – creative application of artistic and scientific principles in developing or improving household items and environmental objects in design project solutions, using scientific discoveries and the latest technologies to ensure the users' aesthetic, usability (functional), personal and environmental safety needs and sustainability, as well as production requirements.

The professional Master's study programme "Design Engineering" corresponds to EQF and LQF level 7. Its title indicates the goal of the study programme to provide students with the opportunity to acquire theoretical and practical knowledge in the field of design and technology at a corresponding to professional Master's degree level, preparing **clothing and textile production technology specialists,** who ensure the company's order fulfillment, their execution process, and employee management, effective development, implementation, and management of new technologies, methodologies, and systems, as well as improvement and expanding the understanding of professional ethics and socially responsible management; as well as **design specialists** who work in the field of indoor and outdoor product development in accordance with the ergonomic and technological solutions of their design usability, using appropriate raw materials (wood, metal, textiles, etc.), the respective processing technologies and their knowledge and skills of application of the implementation systems.

The professional Master's study programme is aimed at preparing students to be the leading specialists in the design and textile industries. In order to attain the pursued goal, the objectives of the study programme that are set to achieve specific learning objectives (see the parameters of the study programme) are subordinated. The content of the study programme is designed so that the objectives of the study courses included in it and the learning objectives to be achieved would be subordinated to and ensure the achievement of the overall goal and results of the study programme. The professional Master's degree in "Design Engineering" is awarded after mastering the theoretical and practical study courses of the study programme, acquiring practical skills in a manufacturing company and defending the Master's thesis in the presence of the State Examination Commission.

The terms for the implementation of goals, tasks and study results shall be met. Namely, admission to the study programme requires a professional Bachelor's degree in materials technology and design and a product designer's qualification LQF level 6 or equivalent education or professional Bachelor's degree in clothing and textile technology and engineer's qualification in clothing and textile production LQF level 6 or equivalent education.

Thus, the interrelation among the title of the study programme, the degree to be obtained, the goal and objectives, the study results, as well as the admission requirements is ensured.

The development of the study programme is based on common academically achievable competence levels of both study programme specializations – clothing and textile production technology specialization and design specialization, as a result of which a monolithic study programme was obtained, which is connected with its goals and objectives.

The study programme is based on five thematic study modules, which include the study courses to be completed. It is implemented according to the principle of study courses; in a two year period students acquire concurrently all the thematic study modules of the study programme in the mandatory and restricted elective courses for the indicated specializations.

The learning outcomes to be achieved by the thematic study modules of the study programme are as follows:

- Completing the study courses of the thematic study module *Design Research and Theory* the ability to improve and develop scientific knowledge of the design industry or the textile industry, as well as the ability to develop new knowledge and insights in a purposeful and methodical way are acquired. The young specialists will master the history of design and material technologies in the context of global and local culture; will be able to apply research methods, will know their principles; will know and be able to apply creative thinking techniques and terms of design and raw material technology development.
- Completing the study courses of the thematic study module *Designing, Engineering and Creative Process Management*, the ability to synthesize and design new or improved products and systems, creating the necessary application value, managing a design development or production preparation work team, as well as the ability to argue, reflect and form judgments in the industry context. The thematic study module provides opportunities to acquire analyzing skills of data obtained in order or work task research, and development of concept variants; knowledge of the creation and use of materials and technological innovations and their application in product development; skills in designing, visualizing and testing prototypes and the final concept products; skills of preparation and presentation of presentation materials.
- Completing the study courses of the thematic study module *Project Management*, the competencies to combine science and technology in scientific and professional activity with the public context is acquired. Students acquire the skills of project planning process, as well as professionals and workgroup coordination skills.
- Completing the study courses of the thematic study module *Material Technologies and Production Management*, the competencies to develop and apply theories, models and harmonized interpretations with a systematic approach, critical attitude and insight into the essence of science and technology is acquired. Skills in the application of the latest materials and technologies as well as technological process management are acquired by selecting materials and technologies in accordance with the project concept and usability.
- Completing the study courses of the thematic study module *Design Entrepreneurship, Planning and Management*, the competencies to manage a design company or experimental department, or a textile design and manufacturing company in achieving its goals is acquired. The skills of creating a professional activity identity and creating a structure for a design company or department are acquired. Students will also acquire the knowledge and skills necessary for elaborating an economic activity plan and planning a development strategy.

Annex "Connection among competencies, tasks and courses" shows the interconnection of the set professional objectives and the results to be obtained – academically achievable competence levels, general competencies of a designer or production engineer, and professional orientations.

III - DESCRIPTION OF THE STUDY PROGRAMME (2. The Content of Studies and Implementation Thereof)

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends

in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In 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.

Design in the modern sense is an interdisciplinary professional activity, which includes a versatile, closely related set of tasks, the solution of which requires specialists with an understanding of:

- the business needs of a certain industry with an understanding of the business model in design, as a certain type of thinking and operating technique, determined by the values of the society;
- knowledge of a particular cultural and social environment regarding cultural requirements of the society, which determine different attitudes and requirements towards man-made artefacts, the environment and the expressions of communication;
- natural sciences and nature regarding ecology, resources and the physical, chemical, biological and other regularities of the material world, in order to have a good knowledge of the appropriate use and choice of materials regarding the benefits of their creation, processing techniques and technologies in accordance with the principles of sustainability and circular economy.

The design and technology industry is constantly changing, and a career in it requires a combination of personal creativity and professional skills, including knowledge of raw materials, technology, project development and business/team management. The tasks of specialists include analyzing the range of physical items used in all aspects of daily life and the environment in which they are used.

Today's young practitioners are facing two main challenges: the growing impact of design on society and the growing role of technology in design. It calls for continuous integration of new materials, shapes, fittings, finishes and technologies in artefact and environmental projects, as well as collaboration with production engineers on a daily basis.

The study programme pays great attention to project-oriented studies and the acquisition and use of computer-aided design skills for the interpretation of commercial and technical information, transformation into technological solutions and business networks. Compared to the design technology study courses at the Bachelor level, the LQF level 7 professional study programme offers an opportunity to focus on more complex design and technology implementation principles and the processes that put them into practice.

Upon completion of the study programme, students will be able to implement in practice the design thinking and the designed technology engineering solutions in real life projects and business situations, applying both teamwork and "learning by doing" principles. The study programme is based on the cooperation of customers/users and design specialists, and production technology specialists as system developers. Links with Latvian and international companies allow acquiring external knowledge and skills in design technologies, situation modelling and business strategies. Graduates of the study programme will have expanded their personal vision, will be able to create and manage projects not only in accordance with production and technical aspects but also from a more important strategic and systemic point of view. Students will be able to create a product that matches up the company's brand, scenarios for products, services/environmental objects and incorporate them into complex ecosystems. They will also learn to use the tools of scientific

research and ethnographic (field) research, the latter being focused on understanding people's needs, values, attitudes and desires.

Provision of the necessary knowledge and skills enabling the designer to work as an industrial artist, who combines materials and product idea research to coordinate design and manufacturing technology choices with market and cost research, ensure impact mitigation of the product-related environmental problems and conduct research and professional pedagogical and public education activities, requires interdisciplinary study programmes and technologically and technically appropriate study environment.

Graduates with a Master's degree in design engineering will be well prepared to interpret the needs and trends in society and culture, to develop the most appropriate formats, designs and multimedia to provide the desired sensations and/or functions, as well as the technologies to materialize them.

Products with design added value are gaining more and more demand in both production and services. Therefore, the specializations of the study programme include studies that promote professional, artistic, and innovative and research activities of a wide range, covering the manufacture of clothing and textile and wood articles, as well as smart textile fields because innovative design, which is based on cultural and environmental values and interrelationships, will promote a more dynamic economic development and recognition of Latvia as well as the resilience and well-being of its population.

According to *Cedefop (in Latvian https://www.cedefop.europa.eu/files/9098_lv.pdf)* forecast, by 2025 specific skills will be in demand in different occupational groups. Taking into account the assessment of the economic sectors of the Riga region, the most promising production sectors are metal processing, ***wood processing***, chemical industry, food and beverage production, as well as ***textile manufacturing.*** Despite the reasonably forecasted reduction in jobs in the textile industry in Europe as a whole (a 13% decline from 2013 to 2025), in Latvia there is employment stability and regular demand. This was also predicted in the analytical review of the European Union vocational education website Skills Panorama (2014) prepared for the European Commission by the International Future Center "ICF" (*International forthcoming*) GHK and the European Centre for the Development of Vocational Training (Cedefop) – employment in Latvia will increase by up to 8% (https://skillspanorama.cedefop.europa.eu/sites/default/files/EUSP_AH_Textiles_0.pdf).

Even with employment in the textile, leather and clothing sector declining, the EU-28 will need to replace almost one million workers by 2025 that will retire or leave the sector for other reasons. Taking into account the reduction 611,000 job vacancies are still anticipated.

Thus, it can be concluded that the demand for IDT study programme graduates in both specializations alike – in the design industry and in the textile industry – will increase overall in the labour market both in Latvia and in Europe.

Students, graduates, employers, external experts and industry employers' organizations, as well as other industry organizations, such as the Latvian Employers' Confederation, the Latvian Designers' Society and the *Latvian Association of Textile* and Clothing Industry, were involved in the development of the study programme (including work with the results of surveys of students and employers).

Involvement in the development of the study programme took place in a direct way: by analyzing the existing similar study programmes in the field of design technology (see Section II), summarizing the views of professional and scientific organizations (from seminars and conferences) for future development in the field of design technology, analyzing the results of student surveys of each semester, in addition, doing a survey of lecturers, specialists of the industry and the Institute graduates of Master's study programmes, discussing the study programme goals, objectives,

results and the study courses to be included at the RTU IDT design council meetings, participating in events organized by employers and Career Days.

The professional Master's study programme "Design Engineering" is designed to be modern, open to cooperation and interdisciplinary, able to flexibly respond to market news and design professionals' qualification development requirements, using the structure and advantages of RTU.

RTU IDT has the potential to perform the functions of a structural node in the University ecosystem, the task of which would be to provide successive education in design and the related technologies at all levels of higher education. The study programme is designed so as to support its development basing on the cooperation of departments, institutes and/or faculties, providing an opportunity also for students of other structural units to improve their qualifications or pursue further education in the field of design technologies, basing on lifelong learning conceptual principles and current needs. The development of separate specialization study modules of the study programme and their individual acquisition provides an additional opportunity for the university to attract students from other higher learning institutions as well.

The development of a complex of IDT professional study programmes to ensure successive career opportunities in the field of design technologies, purposefully using the entire RTU education ecosystem and establishing cooperation with the Design Factory as an early professional business incubation base is a good basis for further growth of the design industry in Latvia and the high-quality development of its economy.

The high professional qualification of IDT academic and scientific staff and creative approach to the study process, as well as the ability to attract industry professionals to the study process allows modernizing the study content more fully using the equipment of IDT and other RTU structural units and their experience in developing of design products and testing their prototypes.

IDT, in cooperation with several RTU structural units and scientific institutions of the Republic of Latvia, is already working in such fields of science as product and process prototyping from local renewable resources (hemp fibres, spikes, nettles, limestone and dolomite, wood, conifer-needles) consumer textiles and nano-level modification of veneer for protection against various influencing factors (UV radiation, moisture, material-degrading and pathological microorganisms), improvement of military equipment and special-purpose clothing, development of smart textile prototypes for various applications, anthropometry and development of clothing design methods, smart textiles and comfort in clothing.

In addition to full-time studies, IDT also plans to provide training and courses for company employees offering to acquire separate study modules of the study programme. Thus, there will be a possibility to have the study modules/courses of the study programme evaluated by the representatives of the industry with the potential to improve the study programme.

Defending Master theses in the presence of the State Examination Commission, which includes production managers, is also a great opportunity to learn about the current needs of the industry and if the study programme meets these needs. Not only are the representatives of the companies included in the State Examinations Commission invited to the presentation procedure, but also the manufacturers who are interested in attracting new specialists to their company. During the discussion of the defence results, manufacturers are especially asked to evaluate the topicality of students' thesis, point out shortcomings and offer promising directions for research or practical development.

2.2. Assessment of the interrelation between the information included in the study

courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In 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.

The professional Master's study programme "Design Engineering" in its structure and content is focused on attaining its goal. The goal of the study programme is closely related to the learning outcomes to be achieved as defined for the study programme, which is achievable during the study courses. The aims set in the descriptions of study courses are closely related to the results to be achieved by the common study programme, while in order to achieve the planned learning outcomes after completion of the study programme, the study courses are interrelated and complement each other. The connection of these study courses with the learning outcomes of the study programme is reflected in the mapping of the study courses (Annex 3). In order to achieve the results of the study programme successfully, a certain sequence has been observed in the planning of the implementation of the courses. The study program plan is attached in Annex 4. Descriptions of study courses are compiled in a single RTU Study Course Register. Descriptions of the study courses included in the professional Master's study programme "Design Engineering" are attached in Annex 5. The total number of study courses of the professional Master's study programme "Design Engineering" is 34. Of these, 16 are Part A study courses, where 6 are joint study courses for both specializations, 5 are for Clothing and Textile Technology specialization and 5 for Design specialization. Fifteen (15) Part B study courses, where students have the opportunity to choose study courses from the other specialization Part A study courses (6 study courses are offered as elective), 5 are language block study courses. Two (2) internships of study courses (for each specialization) and 2 study courses – Master thesis (for each specialization).

The duration of the professional Master's study programme "Design Engineering" is two years. The whole study process is divided into four semesters. The credit value of the study programme is 80 CP (1 CP/week x 80 weeks). In the proposed study process model, all study courses are grouped into five thematic study modules, which provide the necessary set of professional Master's level competencies in product and process design, design process management, project and business management in design and engineering fields – with the opportunity to take mandatory and restricted elective study courses. This approach of thematic study modules avoids overlapping of the topics to be included in the study courses.

The thematic study modules of the study programme courses are described below.

1. Design Research and Theory

The thematic study module of design research and theory provides knowledge and practical research experience necessary for the development of design products, critical thinking and analysing skills, creative activities, project management and business management study modules and basics of data analysis for planning the design economic activity in acquisition of the business study module. The research experience acquired in the study module provides the basis for doctoral studies.

The study module provides knowledge about the designer's social and environmental responsibility in the context of professional ethics as professional qualification ability, using the latest professional creativity methods and guided by the criteria of responsible and good practice of professional activity in creating new products.

The content acquired in the study courses of the study module together with the design study courses of other thematic study modules is evaluated in the generalized assessment of semester projects and Master thesis.

2. Designing, Engineering and Creative Process Management

The thematic study module of designing, engineering and creative work management provides creative activity abilities for designing ergonomically and technologically justified new design products, leading the work process individually or in a workgroup. The knowledge acquired in the study programme and study module ensures the management ability of design creative process being the leader of the team's point of view and design idea, developing individual and complex projects, guided by the requirements of design thinking, brand management criteria and industry trends. The study module, based on the criteria of economic return, provides a concept-based approach to designing project implementation.

The study module is closely related to the study modules of Project Management, Materials, Technology and Production Management and Design Entrepreneurship, Planning and Management.

3. Project Management.

The thematic study module of project management provides professional skills and knowledge to develop and manage design development projects of customers of local, or international significance competition, focused on the interests of users and society. The aim of the study module is to provide abilities, in accordance with the competition regulations and best practice experience, to prepare and execute design development project applications, substantiated financial calculations, plan the implementation process, time schedule, financial flow, ensure stakeholder cooperation and public relations.

4. Materials, Technologies & Production Management

The thematic study module of materials technologies and production management provides professional knowledge of the latest types of materials in the industries involved in design development, their application and processing methods, types of production technologies and trends of development. The study module introduces the theory of management of the production organization of design products, acquiring theory and practical experience in design offices and/or manufacturing companies.

5. Design Entrepreneurship, Planning and Management

The aim of the thematic study module of design entrepreneurship, planning and management is to ensure students' abilities to start a business in the field of design and manage its processes. The knowledge and experience of business management acquired in the study module – selection of design business type, business plan development, financial planning, accounting, marketing, branding and intellectual property management – provide not only a solid basis for students to start a business but also professionally and commercially sound criteria for the development of design projects.

The thematic study module map of the courses of the study programme is shown in Annex "Map of thematic modules of study subjects" It is based on five study modules aimed at acquiring specific knowledge, competencies and skills required in the industries that meet the requirements of the LQF level 7, the qualifications structure of the arts industry, design and creative industries, and textiles, clothing, leather and leather products manufacturing industries qualification level 7 requirements (in Latvian: https://registri.visc.gov.lv/profizglitiba/dokumenti/nozkval/NKSK_tekstils.pdf), (in Latvian: https://registri.visc.gov.lv/profizglitiba/dokumenti/nozkval/NKS_maksla.pdf)

The amount of mandatory joint study courses of the study programme for both specializations is 25 CP. The common study courses provide knowledge about the problems of the 21st century, sustainability issues in design and technology, design and technology project management and marketing, as well as scientific research methods.

The compulsory part of the study programme also provides for specialized study courses, which provide design specialization students with knowledge about design in the amount of 19 CP, aimed at satisfying user requirements, change-oriented design, knowledge about product design and development, as well as related support tools – parametric 3D modeling and simulation. Whereas, students specializing in clothing and textile production technologies in the amount of 19 CP acquire intelligent product design processes, product life cycle and quality system management, technological systems and supply chain management, clothing design 2D and 3D technologies.

The study courses of the restricted elective Part B of the study programme (7 CP) allow the students to deepen their knowledge in the chosen specialization. In this section, students have the opportunity to select study courses also from the mandatory or restricted elective study courses of the other specialization. For example, in addition to design-specialized study courses, the design students may choose study courses related to the design of smart products and the management of the product life cycle and quality systems. Students specializing in clothing and textile production technologies besides specialized study courses in advanced technologies, innovative materials, etc., have the opportunity to choose study courses related to the promotion of understanding of design processes, such as user-oriented design or design for change. The study programme includes also languages (3 CP), an internship (6 CP), and a Master's thesis (20 CP).

Completing the studies, students must write a Master thesis and defend it in the presence of the State Examination Commission in accordance with the “Regulations on Final Examinations at Riga Technical University” adopted by RTU (approved at the RTU Senate meeting on February 23, 2015 (Minutes No. 587)). In order to ensure the preparation of high-quality Master theses, once in a quarter of a semester, IDT organizes intermediate inspections of master theses, during which the student presents the Master thesis, as well as obtains recommendations from the lecturers involved in the implementation of the respective study programme.

2.3. Assessment of the study implementation methods (including the evaluation methods) by providing the analysis of how the study implementation methods (including the evaluation methods) used in the study courses/ modules are selected, what they are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

Courses and seminars on the latest pedagogical methods are regularly organized to improve the pedagogical competencies of the academic staff. In-service training is organized at both the university and the faculty level through academic conferences and methodological seminars. RTU has established and operates the Academic Excellence Center, which organizes academic staff development events at the university level.

The content of the professional Master’s study programme “Design Engineering” consists of lectures, practical, laboratory and group work, as well as independent work that complies with the requirements of regulatory enactments, observing the RTU Senate decision “On uniform requirements for study programmes”. The compliance of the study programme with the state

education standard can be found in Annex 2.

The study programme “Design Engineering” is based on the identification of challenges of design and technology in the 21st century, smart technologies, science and research, and socially responsible entrepreneurship, and is implemented through project-oriented studies. During the studies, two large-scale study projects are developed, where the knowledge acquired in all study courses taught in the specified semester is applied (Fig. 1). Study courses are developed by creating a mutual link between one study course and another, without repeating the information to be taught.

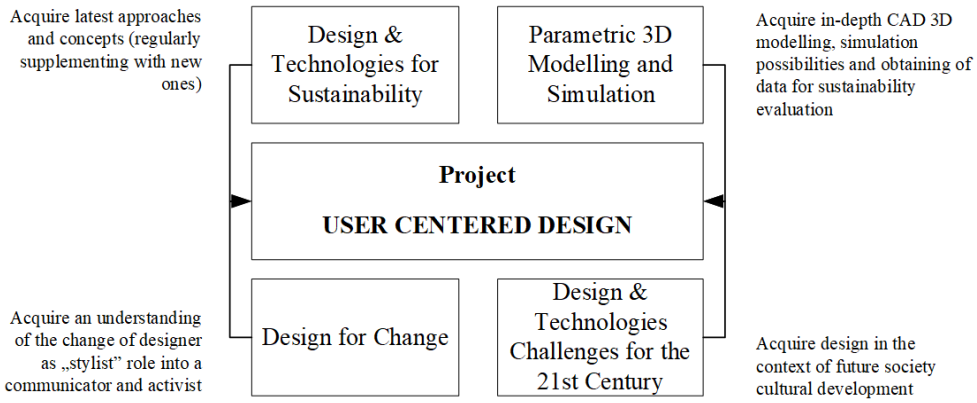


Fig. 1. Schematic example of project-oriented study implementation

Mandatory and specialized study courses of two semesters are concentrated around one thematic central study project in each semester. The specialized courses provide the necessary knowledge and skills for the implementation of the study project. In the 1st and 3rd semesters, students specializing in clothing and textile production technology and in the 2nd and 3rd semester students specializing in design can plan restricted elective study courses or advanced specialized study courses or can use exchange programmes for studies or internship at another university. The 3rd and 4th semesters are intended for the elaboration of the Master thesis.

The projects to be implemented in the study process can be interdisciplinary, for example, when students of design and manufacturing technology work in teams, developing smart product design or sustainability projects. The thematic directions of study projects are coordinated with the IDT current research directions or projects. Projects run simultaneously with study courses as independent work in teams coordinated by the project manager/coordinator. The teachers conducting the course consult project teams and assess them in the exam. Within the framework of project development students have the opportunity to collaborate with entrepreneurs. Project-oriented education promotes students’ motivation to acquire theoretical material in depth and nuance because theoretical knowledge is to be used to ensure the quality of project development. It unites the study programme thematically, thus making it less fragmented, easier to understand and more “user-friendly” for the end-user (student). Study work organized in this way promotes successful achievement of learning outcomes. At the conclusion of the studies, students will have a “portfolio” that will ensure a more successful entry of the new specialist into the labour market.

During the studies, the continuation or start-up of students’ businesses is supported as incubation for independent economic activity and also the development of study and research activities and project development in relation to the industry trend and its model.

Assessing student achievements, a summative assessment system is used, when the final grade is formed from several components. Assessment of student learning outcomes takes place in accordance with the Regulations on the Assessment of Learning Outcomes adopted by the RTU Senate, which can be found on the study regulations page of the RTU website (the English

translation is in the file of Appendix 04 of the List of the governing regulatory enactments and regulations of the higher education institution/ college).

The pedagogical methods of the course implementation, as well as the evaluation methods are chosen by the academic staff responsible for the study course, in accordance with the content of the study course and the specifics of the study programme, as well as the needs of students. The lecturer must acquaint the students with the specific assessment criteria of each study course in the first lesson.

The main advantage of the summative assessment grading system is that the final grade consists of several components. Thus, while still working during the semester, students are already influencing their final grade. The assessment criteria for study courses and individual/homework are previously published on the ORTUS portal. The evaluation of homework, tests, reports, presentations and other work performed during the semester is assigned a certain proportion in the final assessment. The structure of the assessment for their study course is determined by the academic staff themselves, taking into account the decision of the RTU Senate that the examination grade may not exceed 50% of the final assessment. When choosing the criteria and methods used for the assessment of the study results, the specifics of the study programme and the results to be achieved are taken into account.

Knowledge is assessed according to the 10-point system in the form of exams and study papers, or according to the “passed/failed” system in the form of tests. Both, written and oral examinations must be taken, depending on the specifics of the study course. Exam questions are prepared and issued to students in a timely manner by the lecturer, who conducts the relevant study course after coordination with the leading lecturer. The final assessment of the examination takes into account the assessments of the work during the semester, the artistic and aesthetic value of the creative works, the originality of the design and construction, the quality of the presentations.

The Master thesis is a scientifically practical solution to a specific business problem, its implementation and defence is the final part of studies and a prerequisite to be awarded a Master’s degree. The master’s thesis may be supervised by lecturers having Dr. or Dr.hab. academic degree.

The Master thesis completion plan is supervised by a commission corresponding to the specialization at least three times at various stages of completion. The evaluation of the thesis takes into account the choice of the problem to be solved, the originality of the solution, the correct and creative use of the material to be acquired, the accuracy of the obtained result.

State final examination commissions corresponding to the specialization are formed for the evaluation of Master theses, which are chaired by specialists in the field, 50% of the commission are external industry specialists, 50% are lecturers of the study programme, doctors of the relevant science. The Master thesis defence is public and it shall be announced no later than 10 days before the specified date. The defence procedure includes a Master's degree candidate's report with illustrations, discussion in the form of answers to questions, presentation of the review to the audience, answers to the reviewer’s remarks, the supervisor's reference. At the end of the defence procedure, the commission discusses the results in a closed session, makes a decision on the assessment of the work and awarding/not awarding the qualification.

If the decision of the commission is negative, the candidate for a Master’s degree has the right to submit a motivated appeal to the faculty council within a week from the date of the defence. The council examines the appeal within a month, if it is considered justified, the candidate can defend the work at the next session. In this case, the applicant is not considered unsuccessful.

All activities related to the organization of the Master thesis defence procedures are performed by the structural unit in which the thesis has been developed in cooperation with the IDT records

department.

2.4. If the study programme entails a traineeship, provide the analysis and assessment of the relation between the tasks of the traineeship included in the study programme and the learning outcomes of the study programme. Specify how the higher education institution/ college supports the students within the study programme regarding the fulfilment of the tasks set for students during the traineeship.

For the course Internship of the professional Master's study programme "Design Engineering" Practice Methodological Guidelines have been developed for the students of the specialization, both – clothing and textile production engineers and designers. The methodological instructions have been approved by the commission of IDT and the study direction "Production and processing". The internship of the professional Master's study programme "Design Engineering" is planned in the 3rd semester – in the amount of 6 CP.

The internship is supervised by the internship coordinator appointed by the head of the structural unit, who is responsible for the planning, provision and supervision of the internship. The internship on the part of the company is led by the internship supervisor – an employee appointed by the company who has higher education and work experience in the field corresponding to the student's specialization.

The internship is provided by the IDT or the student chooses it independently coordinating it with the internship coordinator.

IDT, the company and the student enter into a tripartite agreement, which sets out the obligations, rights and responsibilities of the parties. The appointment of a student in the internship is formalized by an order of the head of IDT, indicating the term of the internship, the name of the company and the coordinator of the student's practice. If the company is not located in Latvia or the student is a foreign citizen, a tripartite agreement is concluded in English.

The internship for foreign students is the same as for Latvian students. A foreign student can choose an internship place in Latvia, abroad, or in his / her home country. If the internship is selected to be in a foreign company, the internship coordinator evaluates the company's ability to ensure the expected learning outcomes of the study program before concluding the contract. For example, currently, one student has concluded a tripartite internship agreement with a company in Estonia. Before concluding the contract, the internship coordinator held discussions with the student, ascertained the existence of the company, and coordinated the internship tasks with the company.

The order of the head of the structural unit on students' appointment in the internship is available on the portal ORTUS in the study course Internship.

Depending on the chosen specialization, students have access to information about manufacturing companies.

The internship guidelines describe the goals and tasks of the internship and the schedule of the internship in detail. The tasks of the internship are closely related to the learning outcomes to be achieved in the study program.

Clothing and textile production technology specialization internship

The aim of the internship

Consolidation of theoretical knowledge acquired during studies and acquisition of practical skills in the field of clothing and textile production, and compilation/selection of information necessary for the Master thesis.

The objectives of the internship

1. Getting acquainted with the structure of the company's technological and administrative departments, the technologies and production equipment used, their work tasks and interrelation between them.
2. Analysis of the company's quality management systems.
3. Human resource management standards used in the company (SA 8000 Social Accountability standard), ISO14001 environmental management standard.
4. Analysis of material values and information flow in the company.
5. Ability to apply the acquired knowledge in practice, generating ideas for improving the company's operations in the process of creating a new product, searching for technological and organizational solutions, introducing new developments in production.
6. Compilation/selection of practical information necessary for the Master thesis.

Internship of design specialization

The aim of the internship

To acquaint with the latest materials and technologies in the field of specialization, evaluate their potential applications; to acquire skills in designing industrial collections, demonstration events and exhibition displays; to master skills in setting up and leading workgroups for the implementation of events, establishing necessary communications at various levels and attracting sponsors.

The objectives of the internship

1. To become acquainted with the latest materials and/or technologies in the field of specialization.
2. To get acquainted with the development stages of industrial collections, data provision, deadlines and time schedules, quality control, full package of the documentation to be elaborated, forms of collaboration with partner organizations and subcontractors, drawing up of work standards.
3. To design exhibition displays, other large-scale events and the necessary attributes; to select/produce the objects to be exhibited; to prepare object information sheets; to arrange exhibitions; to develop surveys, reviews and critical evaluations.

The objectives of the internship are related to the learning outcomes to be achieved and the accomplishment of the objectives is based on the building of collaboration, which is necessary for the development and promotion of new products/services, the establishment of communication with various partners/structural units in the context of the institution and outside it. Students regularly report on their progress to the internship coordinator.

At the end of the internship, students submit an internship report covering all sections set out in the Internship Methodological Guidelines. The report shall be accompanied by a reference from the internship supervisor at the company. The report is reviewed by the internship coordinator. A student defends the internship report in the presence of a commission appointed by the director of IDT consisting of at least two people with the participation of the internship coordinator. Meetings of the Commission are recorded in the Minutes. Student achievement in accomplishing the internship aims and objectives as well as the internship report is assessed with a grade in a ten-point system.

The description of the study direction in Annex 9 includes a list of the companies which ensured the internship during the reporting period. The list of the companies is available to students and they can select a company where to undergo the internship. The internship coordinator provides support to students in communication with the company. Also, if any issues arise during the internship, students address the internship coordinator to resolve them.

Students often choose the internship place themselves, wishing to acquire specific knowledge that can be provided by a particular company or giving preference to the internship place closer to their place of residence. In such cases, the internship coordinator assesses the conformity of the company to the aim of the internship and learning outcomes to be achieved.

To ensure internship for students companies that promote the achievement of study programmes learning outcomes have been selected, the companies suitable for the specializations of the study programme and the industries they represent are chosen – the companies of the art and design industry as well as the textile industry which have proven to be successful players in the market for a long time and with whom IDT has established a successful collaboration.

The procedure for organizing an internship at RTU is described in Section I.

2.5. 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 evaluations of the final theses.

In terms of topics, the Master's degree students' graduate papers within the study programmes "Material Technology and Design" and "Clothing and Textile Technology" are very versatile and relevant for the respective industry. The graduate papers include the application of innovative materials and technologies in the development and improvement of design, textiles and wood products, their research, optimization solutions for the technologies applied in the industry. A certain part of the papers is developed in collaboration with the companies operating in the industry. This allows students to get acquainted with the company's operational processes and evaluate them, gain practical skills, as well as offer necessary optimization solutions both for the production process and improvement of product properties, which is reflected in the graduate papers.

Topics of Master theses are chosen in accordance with the sub-directions of the Materials Science implemented by IDT – *Textile and Clothing Technology* and *Wood Materials and Technology*.

In the Master theses related to the direction of the textile and clothing technology:

- smart textiles, integration of clothing, sewn products and a relevant electronic system, and the development of innovative solutions have been researched, as well as innovative environmentally friendly products and technologies have been developed ("Dance Show Costumes with Data Transmission Feature", "Textile Integrated Conductive System with Optical Fiber Display", "Light Effects in Smart Clothing Initiated by Touch");
- textiles have been modified at nano-level; coatings and nano-webs containing bioactive and other functional substances have been developed ("The Study of Modified Textile Local Exposure on Tissues", "Modification of Cotton Yarns for Smart Socks Production", "Hemp and PLA Composite for 3D Printer Filament", "Technology Development for Betulin Integration into Nano-fibers Web", "The Development of Nonwovens Coated with Metal and Their Oxides' Nanoparticles");

- comfort in clothing has been researched and the fit of clothing has been evaluated ("Clothing for People with Limited Mobility", "Physical Training Suite Design for the Latvian National Armed Forces", "Dynamic Anthropometry for Garment Development");
- functional textiles, clothing and protection means have been researched, and their design process has been improved ("Impact of Climatic Factors on Characteristics of Compression Hosiery", "The Development of Hybrid Fabrics From Bast and Glass Fibers", "Conformity Evaluation of Camouflage Pattern");
- 3D anthropometric data has been integrated into CAD environments ("Usage of 3D Technologies in Garment Designing", "Identification of Clothing Constructive Defects in Three Dimensional Measurements");
- renewable resources, their processing waste and optimization have been researched ("Zero Fabric Waste Possibilities for Sustainable Fashion Design", "Textile Waste Recycling").

In the Master theses related to the direction of the wood materials and technologies:

- natural and chemical fibre, materials and products have been modified and their properties have been optimized for improvement of the user's comfort and safety ("The Development of an Adjustable Membrane Absorbing Panel to Reduce Low-Frequency Modal Resonances in Premises", "Investigation of Veneer Moisture Resistance Improvement Feasibility", "Design Social Responsibility and Interaction Between Theory and Practice in Higher Schools Interiors", "Use of Moving Joints in Product Design");
- wood and wood-based materials and structures have been researched and innovative solutions have been developed ("Wedge Joint for Board Material Constructions", "Optimization of Bent-glued Details Form Parameters", "Edge Finishing Materials and Technologies of Wood Based Panels");
- the knowledge base of wood processing tools and machinery, wooden historical constructions and terminology has been developed ("Historical Furniture with Cultural Value in Kurzeme from the 18th Century to the Early 20th Century", "Woodworking Cutting Hand Tools");
- sustainable products with high added value have been designed of wood and other renewable resources in Latvia and their processing waste; manufacturing technologies have been developed and optimized ("Design's Role in Sustainable Consumption", "Waste Recycling and Reuse Potential in Case of "MDT Baltic" Company", "Sustainability Analysis in the Furniture Designing Process", "Composite from Raw Renewable Materials with Sound Absorbing Properties").

A list of the graduate paper topics starting from the academic year 2013/14 is attached in Annex "The Themes of Master`s Theses".

Master theses are assessed by the State Final Examination Commission of the study direction "Production and Processing". The Commission is composed of the employers' representatives. Not only the employers' representatives invited to the defence procedure are included in the State Final Examination Commission, but also the manufacturers who are interested in attracting new specialists to their company. It is a great opportunity for the industry representatives to learn about the solutions proposed in students' papers. In the course of discussion of the defence results, the manufacturers are especially asked to evaluate the thematic topicality of students' papers, to highlight shortcomings and offer perspective research directions or practical developments for the next year's graduates or further research in Master's study programmes.

The average grade of the graduate papers is 8.37. In the covered academic years (7 academic years), the qualification papers of 22 students have been assessed with the highest grade – 10 (excellent).

2.6. Analysis and assessment of the outcomes of the surveys conducted among the students, graduates, and employers, and the use of these outcomes for the improvement of the content and quality of studies by providing the respective examples.

In the midterm and at the end of each semester, surveys of students are organized on the RTU portal ORTUS where students have an opportunity to express their opinion about the study courses completed in the midterm and in the semester. Students evaluate the content, organization and methodological materials of the respective study course as well as the lecturers' attitude; in addition, there is a possibility to make comments highlighting shortcomings or praising the lecturer. All academic staff members have the opportunity to get acquainted with the students' responses and evaluate them so as to improve the study course. The evaluation of all study courses is available to the directors of the study programmes. In the reporting period, it was concluded that students often fill out the questionnaires formally. Comments and proposals are written very rarely, and they tend to be contradictory. The average students' rate of the study courses implemented by IDT is 4.5 points (score scale from 1 to 5, where 5 is the highest score). Most of the study courses have been evaluated positively; however, no additional comments have been made.

A survey of students of the professional Master's study programmes "Material Technology and Design" and "Clothing and Textile Technology"

An anonymous survey was conducted to find out the students' opinions about the two professional Master's study programmes implemented in the reporting period. The response was low, and the questionnaire was filled out by a small number of respondents. The questionnaires were filled out in the Internet environment by sending e-mails. The form of the Ortus survey is constantly being expanded, however, at the time of the questionnaire it was not possible to ask questions related to the study program in general, therefore e-mails were sent and the survey was made via Google Forms.

Most students (71%) were satisfied or partially satisfied with the chosen study programme. The available infrastructure, availability of literature, and the acquired theoretical and practical knowledge were assessed positively. The opportunities for international mobility were highly appreciated. However, shortcomings of the study process were also highlighted.

For example, a certain part of students (28%) is of the opinion that there have been problems with the study schedules. It should be recognized that the study schedule has always been an acute problem, especially for students of Master's degree study programmes as these students often have a full-time job outside RTU. The students express willingness to study in the evenings or at the weekends. Such a study schedule was introduced; however, student attendance in the evenings and at the weekends was unsatisfactory. Some students (22%) are not satisfied with the study environment, although the IDT premises are situated in a modern building that provides a contemporary and creative atmosphere. All IDT facilities, infrastructure and equipment are available to students upon request. Some students (16.7%) have noted that learning materials were not available. The academic staff members have the possibility to attach lecture summaries and presentations in the learning environment ORTUS. In addition, the learning environment ORTUS provides a description of the study course with a list of recommended literature available in the Scientific Library. All students have the opportunity to go to the library and get acquainted with the necessary literature.

When answering the question about the improvement of the study programme, the following proposals were made: students with greater emphasis to be placed on the design study courses

which are linked to practical tasks; the opportunity to study visual modelling programmes in depth; to reduce the theoretical part in the papers to be submitted; greater involvement of the industry representatives in the learning process; creative workshops; greater emphasis on the latest technologies; more practical work, the results of which can be included in the designer's portfolio; to attract new lecturers with fresh insight and to coordinate lecture schedules. The students also propose to attract professional practitioners and foreign guest lecturers; express willingness to complete a study course related to design; propose that the volume of independent work should be proportional to the credit points of the study course; to introduce new and inspiring teaching aids as well as modify the entire study programme.

One student has made a positive comment about the study programme in general: "The study programme develops creative and constructive thinking; it provides the opportunity to choose the industry of future occupation in the labour market because a student is a professionally qualified specialist.

Participation of students in the improvement of the study process

The Student Self-Government of the Faculty of Materials Science and Applied Chemistry is actively involved in the improvement of the study process and the provision of interesting extracurricular activities. Seminars on Study Quality are organized every semester, where students discuss shortcomings and opportunities of the study process. If solutions are offered or essential proposals are made, the administration of the faculty is informed about them. Every two years the Faculty organizes Career Days to inform students about job opportunities in the industry.

Student representatives are members of the IDT Council where they have an opportunity to express their opinion and influence decisions. Students have an opportunity to evaluate the quality of individual study courses in a survey, which is organized twice a semester in the learning environment ORTUS.

Furthermore, students can always address the director of the study programme with questions and proposals for the improvement of the study programme.

A survey of graduates of the professional Master's study programmes "Material Technology and Design" and "Clothing and Textile Technology"

In order to obtain the opinion of the graduates of the two professional Master's study programmes, the questionnaires were distributed in the Internet environment by publishing the questionnaire in the IDT Facebook profile, on the RTU Alumni Association platform https://rtuconnect.net/ and by sending e-mails. The questionnaires were filled out anonymously. The questionnaire was completed by 36 respondents, of whom 69% are graduates of the study programme "Material Technology and Design", while 31% are graduates of the study programme "Clothing and Textile Technology".

Respondents' answers about the reasons for selecting the Master's study programme differ and most of them are related to the specifics of the study programme and interest in the industry (clothing, textiles, wood materials, interior, design and production). The following reasons are also mentioned: the willingness to conduct research, the location, a recommendation from former students, the possibility to receive the ESF scholarship, the willingness to continue studies in the same direction after obtaining a Bachelor's degree, the possibility to choose the study courses offered by the Faculty of Architecture, interest in the study courses of the study programme, improvement of technical knowledge, free of charge education and the willingness to obtain a Master's degree.

Most graduates (94.5%) were satisfied or partially satisfied with their choice to study in one of the

two Master's study programmes. The graduates were satisfied or partially satisfied with the acquired theoretical knowledge (94%) and practical skills (74.8%) as well as with their proportional shares. The graduates also appreciated the study rooms, infrastructure and technical provision. However, critical remarks were made on these issues as well.

The graduates proposed to incorporate more practical classes outside RTU into the study process; to attract more guest lecturers; to look more broadly at the possibilities of CNC machines and related software; to attract personnel working in companies; to supplement study courses with sketching, furniture and interior design; to ensure a closer link between study courses and the graduate paper, more technical and practical study courses, more elective study courses and the opportunity to do an internship in different companies. Furthermore, the graduates propose to introduce Gerber Design Software into the content of the study programmes, visit companies more often, teach technology and design more intensively, invite more guest lecturers from abroad, involve students in research more closely, provide more information about industrial production, and involve factory specialists in the implementation of the new study programme.

Graduates mostly work in the companies of the industry and occupy a position in line with their education as well as use the acquired knowledge and skills in their work, for example, the knowledge in scientific research and materials science, knowledge related to clothing production, theoretical knowledge in furniture production, planning of the industrial collection; they also welcome several study courses. However, some students indicated that they would like to exclude several study courses with overlapping content from the study programmes.

A survey of employers

A survey was carried out among the companies related to clothing production and textile processing ("Specter Latvia", SIA "SRC Brasa", SIA "66 NORTH BALTIC") and the companies involved in furniture production and interior design ("Rīgas interjeri", SIA "THOMSON Furniture", "Nakts Mēbeles" (SIA "MarksM"), "ab virtuves", SIA "Luksotika", SIA "MD Noass"). Some companies wished to remain anonymous and mentioned the types of their business – lingerie and furniture made to order. A total of 12 companies were surveyed.

The surveyed companies employ graduates or students do their internship there. One of the surveyed companies has participated in the development or improvement of Master's study programmes implemented by IDT.

In general, employers characterize the graduates as able to work in a team, carry out the assigned work duties responsibly and in good quality, and as having good theoretical and practical preparedness and the ability to immediately carry out the work duties assigned. Representatives of some companies have a different opinion and believe that the graduates have good theoretical knowledge but insufficient practical skills; however, after a short introduction to the workplace they acquire the ability to carry out their work assignments. Two employers commented that the graduates have an insufficient knowledge base related to new materials (in the field of furniture production); that graduates are different, each has his/her own strengths and weaknesses. In general, their theoretical and practical competence was given a positive assessment; however, it can be noted that students sometimes have difficulties in finding the link between theory and practice.

Describing shortcomings of the graduates' competencies and skills, employers point out lack of confidence and self-assurance, practical skills related to clothing production processes, skills in working with special equipment/technologies and innovative thinking. Responses from the representatives of the companies involved in furniture production and/or interior design also point

to shortcomings related to psychological readiness; young people are not ready to take an active part in carrying out their work duties and have difficulties with adapting if rapid changes are necessary. The graduates have a relatively poor orientation in global design trends and lack knowledge in the history of design. The graduates lack knowledge in psychology that can be used in their work with customers. The graduates lack practical skills in the field of furniture production and do not know how to plan their time for the completion of the work assignment.

At the end of the survey, the representatives of the companies provided positive feedback on the graduates' work and expressed the hope that it is possible to combine Master's studies with a career. They propose in-depth teaching of communication psychology to students, support of theory with practical tasks, and in-depth teaching of various software.

In the new professional Master's study programme "Design Engineering", the objections of the students, graduates and employers have been taken into account; new exciting study courses have been introduced; an opportunity to choose study courses in both specializations has been provided; project-oriented studies have been introduced that increase the proportion of practical work compared to the theoretical part and are related to the development of real products. Also, industry representatives and foreign guest lecturers are involved in conducting lectures within the study courses.

2.7. Provide the assessment of the options of the incoming and outgoing mobility of the students, the dynamics of the number of the used opportunities, and the recognition of the study courses acquired during the mobility.

Currently, one student of the professional Master's study programme "Design Engineering" is planning to do an internship in Italy with Erasmus. The information is provided on two professional Master's study programmes "Clothing and Textile Technology" and "Material Technology and Design" implemented in the reporting period. The students of these study programmes used the opportunities provided by the ERASMUS mobility programme. In the period from the academic year 2013/2014 to 2018/2019, there were 17 outgoing mobilities (Annex Student`s Mobility). The study opportunities were used by 76% of students, while the rest chose internships. Greater mobility (five students) was observed in the academic year 2017/2018, while in academic years 2013/2014, 2014/2015 and 2016/2017 – two (2) students respectively; in academic years 2015/2016 and 2018/2019 – three (3) students respectively. In the study programme "Material Technology and Design", a higher activity of students (11) using mobility opportunities is observed than in the study programme "Clothing and Textile Technology". The majority of students (5) went to Italy, while fewer to other countries, such as Lithuania, Great Britain, Denmark, Germany, Austria, Czech Republic, Portugal, the Netherlands and Sweden.

All students in the program have the opportunity to go on mobility. This requires good English language skills and willpower. The process is related to the search for partner universities, communication and agreement on the admission of the student to study at the partner university. A condition promoting mobility is the opportunity to get acquainted with the study and research process of the partner university, the opportunity to conduct specific research because specific equipment is available. Insufficient funding, various family circumstances, permanent work are obstacles to mobility. Also, taking into account the fact that master's studies last only two years, during which time the content planned in the program must be mastered and a master's thesis must be written, the student must start planning mobility already upon entering the program.

During the reporting period, no incoming mobility of Master's degree students occurred. The new professional Master's study programme "Design Engineering" is also offered in English. It is planned that foreign students will study in this programme.

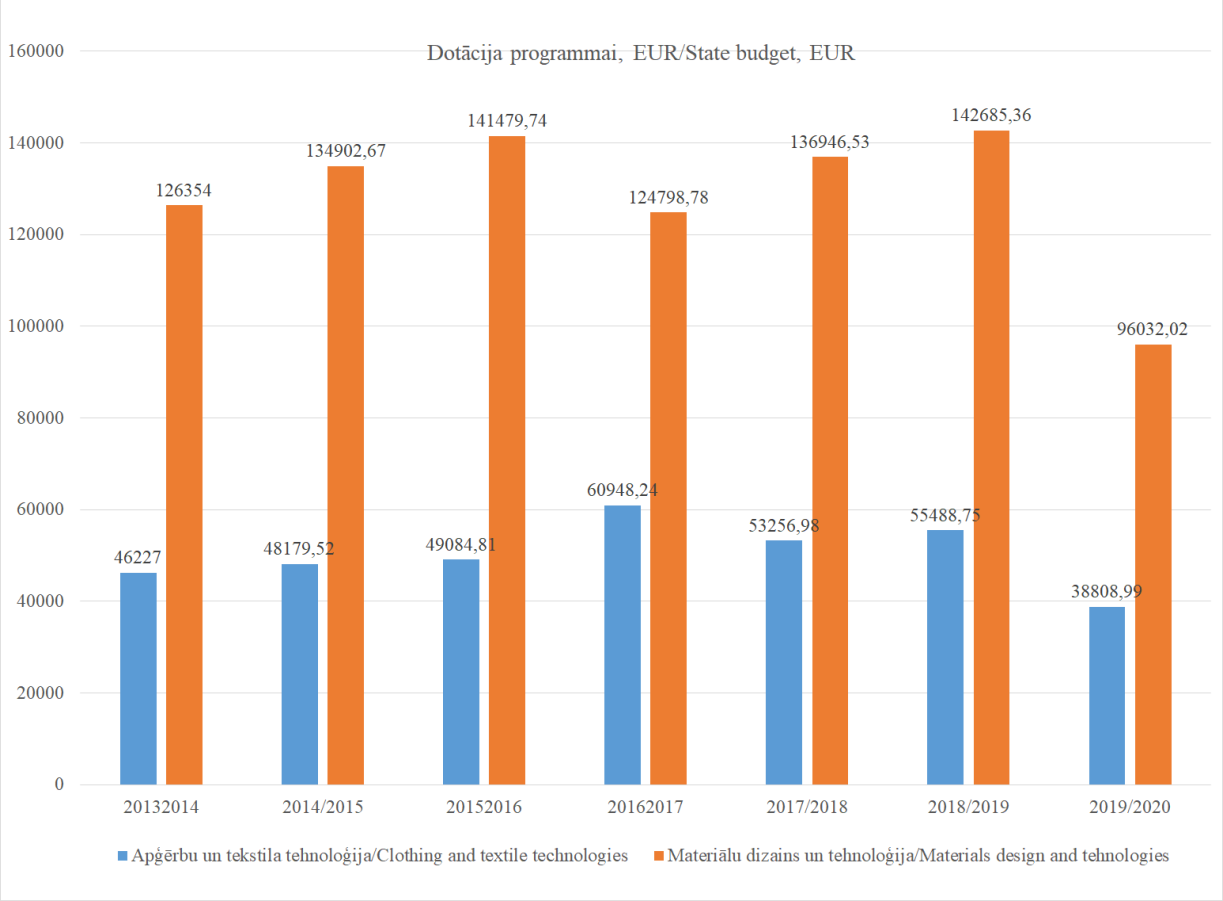
RTU has established a stable and easily understandable system of recognition of the study courses acquired during the mobility. Before leaving, a student individually agrees with the director of the study programme on the list of the study courses at the foreign university to which the study courses planned in the given semester at the home university will be considered equivalent. If there are any changes during the mobility, they are agreed by electronic means. Upon returning from the exchange programme, the study courses acquired at the foreign university are recognized for a student, provided that a positive assessment has been obtained, which is confirmed in the documents issued by the university. All documentation and the procedure related to the Erasmus studies are provided by the RTU International Cooperation and Foreign Students Department. The Erasmus partner universities can be searched on the RTU Erasmus+ website: Materials, wood, textile, Design.

III - DESCRIPTION OF THE STUDY PROGRAMME (3. Resources and Provision of the Study Programme)

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. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

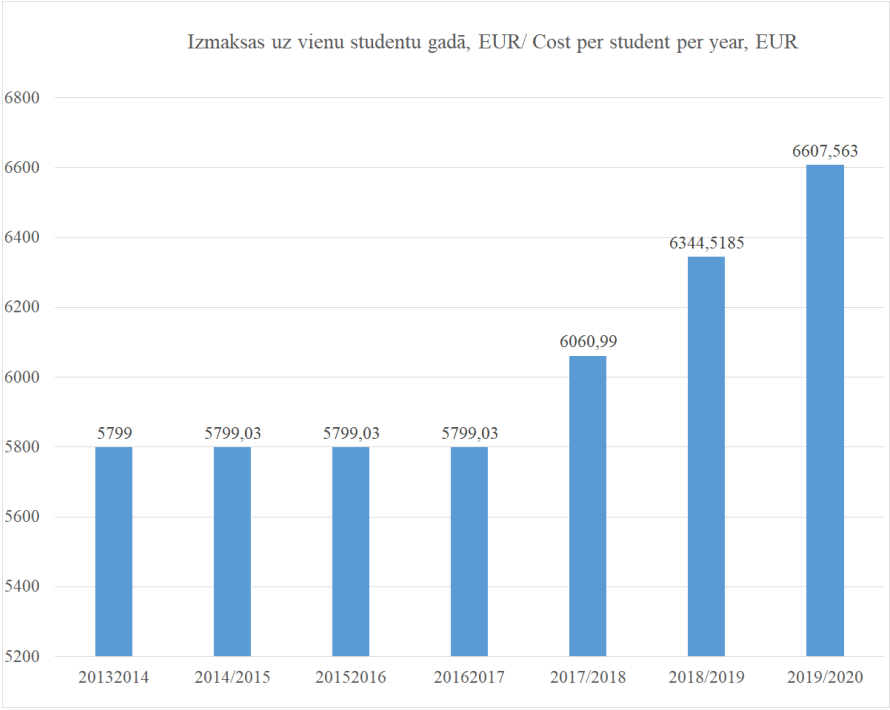
The professional Master's study programme "Design Engineering" is implemented by IDT of the Faculty of Materials Science and Applied Chemistry (hereinafter referred to as the FMSAC). To date, the structural units of the Institute – the Department of Clothing and Textile Technologies and the Department of Design and Materials Technologies – each has implemented its own professional Master's study programme ("Material Technology and Design", "Clothing and Textile Technology"); consequently, the new study programme has the study base and the provision appropriate for its implementation. IDT provides the teaching activity and methodological work, supervision and defence of graduate papers as well as activities related to scientific work.

Both study programmes implemented in the reporting period were financed from the state budget; none of the students was applied a tuition fee. Funding of the study programme "Materials Technology and Design" was larger, which depends on the number of students in the study programme.



2.att. Annual distribution of the state budget by study programs

Cost per student in the two study programmes was equal with a tendency to increase beginning from the academic year 2017/2018.



3.att. Costs per student per year, EUR

The resources available for the implementation of the study programme are sufficient to ensure the

achievement of the results indicated in the study programme. Upgrading laboratory equipment in the coming years will require additional funding.

The provision of the information base (including the library) is described under the criteria set out in Paragraphs 3.1–3.3, Chapter 3, Section II. Some of the purchased book units correspond to both specializations and are not strictly related to only one field or one study programme (future Fashion designers study in the specialization field “Materials Technology and Design”, also book units related to fine arts are usable and useful in all study programmes).

Students of both specializations study in the master's study program "Design Engineering" (specializations "Clothing and Textile Technology" and "Material Technology and Design"), all book units purchased in the reporting period are also applicable to the named master's study programme. A total of 91 units. All books can be used to implement the programme in Latvian. 83 units can be used to implement the programme in English.

Other RTU structural units are also involved in the implementation of the study programme “Design Engineering”, such as the FMSAC, the Institute of Technical Physics (hereinafter referred to as ITP), the Faculty of Engineering Economics and Management (hereinafter referred to as FEEM), the Institute of Business Engineering and Management (hereinafter referred to as IBEM), the Institute of Applied Linguistics of the Faculty of E-Learning Technologies and Humanities (hereinafter referred to as FELTH) and the Riga Business School (hereinafter referred to as RBS).

IDT has already been operating in the field of smart specializations for several years implementing a number of scientific projects, which has resulted in the development of the knowledge base. Consequently, several study courses related to smart materials and technologies are implemented within the professional Master’s study programme “Design Engineering”. One of them – “Physics and Electronics of Smart Materials” (RTU code: KFM705) – is provided by ITP, making use of the study base at the disposal of ITP, i.e., the academic staff and laboratories.

The professional Master’s study programme “Design Engineering” is focused on the preparation of leading specialists for the companies operating in the industry; therefore, the thematic study module in business, marketing and management is important. The acquisition of the thematic study module “Design Entrepreneurship, Planning and Management” is partly ensured by FEEM IBEM. The task of IBEM is to provide the study course “Contemporary Issues of Strategic Management and Marketing” (RTU code: IVZ789), using its own study base. In addition, the FEEM Department of Innovation and Business Management ensures the acquisition of the study course “Managerial Psychology” (RTU code: IUV408).

Meanwhile, the acquisition of the language block is ensured by the FELTH Institute of Applied Linguistics, while the study course “Business Ethics” (RTU code: PBM446) is provided by RBS.

Within the professional Master’s study programme “Design Engineering”, students and academic staff use the opportunities and resources provided by RTU, such as the common portal ORTUS, IT services, the Learning Management System, the Scientific Research Support System, the Scientific Library, the material and technical base, the financial base, etc. described in the self-assessment report of the study direction in Paragraphs 3.1-3.3, Chapter 3, Section II.

The professional Master’s study programme “Design Engineering” is implemented in the building at Ķīpsalas Street 6, Riga, which is a part of the RTU Ķīpsala Campus (hereinafter referred to as the Campus). In 2013, the building of Creative Industries Centre on Ķīpsala island was commissioned, where FMSAC IDT, the Faculty of Architecture and the Design Factory are located. Upon completion of the construction, the Campus will become the most modern engineering study centre in the Baltics.

The building at Ķīpsalas Street 6 is equipped with modern climate control equipment and technical solutions that are controlled remotely; it is also possible to monitor energy consumption in order to make the buildings more comfortable for students, employees, scientists and guests. The infrastructure of the Campus is provided with everything that is necessary for students, employees and guests; it is possible to park a bicycle and a car, quench your thirst at water drinking points. When developing the infrastructure, all groups of people are considered, including people with disabilities. Parking lots are provided next to each building; there is free access to classrooms, laboratories and other premises, Braille lettering for obtaining the information and inspecting the buildings; all sanitary facilities are designed to meet the requirements. The Association of People with Disabilities and their Friends "APEIRONS" (https://www.apeirons.lv/ (information available only in Latvian)) has praised RTU's achievements regarding infrastructure accessibility provisions for persons with disabilities.

The Campus currently comprises 54 classrooms, 187 laboratories, 19 specialised study rooms, 10 computer classrooms, 12 workshops and several research centres of national importance. There is also a student hostel on the Campus with 950 beds and a special block for people with disabilities. The entire RTU infrastructure is available to students and academic staff in the study programme "Design Engineering".

The total area of the building at Ķīpsalas Street 6, where the study programme "Design Engineering" is implemented, covers 10462.78 m2 with four above-ground storeys, of which 6602.90 m2 are occupied by FMSAC IDT. For detailed information on the area of the premises and the available equipment see in Paragraphs 3.1–3.3, Chapter 3, Section II.

The students of the study programme "Design Engineering" carry out scientific research for their Master's theses and laboratory assignments mainly in one of the 14 RTU FMSAC IDT laboratories, six workshops and two design classrooms/computer classrooms (Table 1). The students have access to the entire IDT infrastructure and, if necessary, they can use any room and equipment.

In general, it can be concluded that the resource and provision base corresponds to the conditions for the implementation of the study programme and the achievements of study results.

Table 1

Laboratories and workshops, and their equipment available in the building at Ķīpsalas Street 6 for the needs of the study programme "Design Engineering"

Room No.	Name, area (m2)	Description
Laboratories		
426	Wooden Materials Research Laboratory (27 m^2)	The laboratory is suitable for research of various materials or their coating surfaces up to nano-level, research of the development of new materials, research of composite materials. Equipment: an atomic force microscope (for acquisition of sample surface topographies at nano-level); viscosimeters (for measuring viscosity of solutions); an optical microscope (100x magnification and a video recording function); an ultrasonic mixer (complete with an electrical spinning device); a calendar (for pressing sheet samples applying controllable pressure and temperature) and a device for determining the surface gloss; a DVG device; a compressor complete with AFM; a portable pH meter; a small vacuum pump; a heating oven; a mixer; an optical microscope with x20 magnification; a conductometer; yarn scales; two magnetic mixers; an interactive whiteboard and a projector.

425	Textile Materials Research Laboratory (30.2 m^2)	The laboratory is used for research that requires heat treatment, such as research of new materials or their coatings. Equipment: an autoclave (for sterilization); a thermal cabinet (for heat treatment of samples) and a Permatest device for determining heat resistance of cloth; an interactive whiteboard and a projector.	
424	Measurement Laboratory (21.6 m^2)	The laboratory is suitable for performing various practical research, testing of materials and identification of their properties. Required climate conditions can be provided and adjusted in the laboratory. Preparations for conducting experiments in EMC measurement, wooden materials and textile materials research laboratories take place in the room. Equipment: a Bruker AFM atomic force microscope; a Permatest SENSORA device for determining heat resistance and vapour permeability of cloth; a Fungilab viscosimeter (provides a possibility to determine viscosity and conductivity of a solution); a Motic microscope with a camera and 100x possible magnification; magnetic and mechanical mixers; a Rhopoint device for determining the surface gloss.	
422, 423, 429	Measurement Laboratory ESM/EMC (16.7 m^2, 38.4 m^2)	The laboratory is suitable for carrying out various research and experiments related to nano-coatings and the production of nano-fibre from polymeric solutions. Equipment: a magnetron sputtering device (for applying metal and semi-conductor nano-layers onto various surfaces); an electrical spinning device (for production of nano-fibres from polymeric solutions); a climate chamber for large samples.	
214	Anthropometric Laboratory (51.8 m^2)	The laboratory is intended for studying measurements and build peculiarities of a human body, which are used for the improvement of clothing and other products, and analysis of their interaction with the human body – fit and ergonomics. A computer-aided design and 3D prototyping system is used for experimental designing and analysis of various assortment of clothing for implementation of various research processes and graduation projects. Equipment: a human body 3D scanning device Vitus Smart XXL® (Human Solutions Group GmbH) with the data processing system AnthroScan. Measuring instruments: anthropometers, measuring tapes, calipometers for obtaining measurements of a human body using manual methods. Computer-aided systems: CAD/CAM system Assyst with the virtual prototyping module Vidya.	
212, 213	Textile Materials Research Laboratory (59.1 m^2 and 77.1 m^2)	The laboratory equipment enables testing and research of the most common physical properties of cloth. The equipment is used both in the study process and scientific research. In some cases the equipment is also used for the provision of external services. Equipment: a vapour resistance and heat resistance testing chamber; a Martindale abrasion and pilling trend tester; an air permeability tester; cloth non-creasing testers for directed and undirected creasing; a cloth robustness tester; a colour resistance tester under dry and wet friction; a cloth draping tester; a cloth surface wetting tester; a universal tester for determining mechanical properties; a colour resistance tester under artificial lighting and humidity; a climate chamber; a dryer; a washing machine; a cloth water-tightness tester; scales; yarn twist meters; a yarn balance tester; a tester for assessing yarn endurance under cyclic tensile loading; microscopes; yarn appearance assessment board winders; yarn winders.	
211	Sewing Machines Mechanic and Embroidery Laboratory (46.8 m^2)	The laboratory enables conducting research on the integration of electronic elements in smart cloth by applying the embroidery. Equipment: 1) sewing machines for laboratory assignments of the type: single-needle straight closing jab, two-needle straight closing jab, single-needle hidden loop jab, two-needle flat loop jab, single-needle edge processing loop jab, two-needle stitching and overhand stitching loop jab, single-needle buttonhole loop jab; 2) embroidery machines – Brother PR600II and Innovis 750E, embroidery computer software Pe Design 8; 3) a straight knife cutting device; 4) a loom for weaving blood vessels.	
114	Layout Design and Wood Processing Laboratory (17.9 m^2)	The laboratory is suitable for performing layout design and production of products, as well as for completing other practical assignments. The room is provided with surfaces, ensuring an opportunity to work at various scales. The laboratory is equipped with a variety of devices and hand tools required for processing various cardboard, wood and polymer sheet and plate materials.	

112, 113	Wood Processing Laboratory with Manual Tools (39.7 m^2 and 16 m^2)	The laboratory is designed for work with solid wood and various board materials; it is suitable for layout design work and production of products using hand or power tools. The laboratory enables carrying out scientific research related to the production of various joints, formation of surface textures, research in material processing using hand or power tools. Equipment: various hand tools, including various types of hand saws (a rigid blade cross-cut saw, single-handed saw, a jigsaw, a veneer saw), joiners' and carpenters' chisels, several types of planers (scraper, smooth plane, mitre plane, grooving plane), files of various roughness, notch and shape,, measuring instruments, auxiliary tools. Also available are various power tools, a reciprocating saw, a belt sander, an eccentric sander, a drill, a cordless screwdriver, as well as modular equipment – a band saw and a disc sander.
111	Wooden Materials Research Laboratory (29.4 m^2)	The laboratory is closely related with the Materials, Technologies and Design Laboratory due to supplementing its sample base. The laboratory is provided with the equipment for determination of humidity, weight, density of wood, wood-based and various sheet and plate loose materials; granulometric analysis of loose materials with a sieve shaker; determination of mechanical properties of various materials using universal test equipment (for perpendicular extraction of nails or screws, three-point bending test, sample tensile test, bonded structures cleavage test, wood sample shear test). Measuring instruments (rulers, calipers, measuring tapes, micrometers) are available in the laboratory. It contains various samples of finishing materials and samples of finishing coatings, samples of upholstery materials, and samples of decorative materials for gluing on surfaces.
109	Materials, Technologies and Design Laboratory (57.8 m^2)	A wide range of samples and other visual aids are available in the laboratory: visual aids for material samples (samples of board and sheet materials, collection of tree species with different sections, 1: 1 scale; wood composite samples); Collection of woodworking joints; Fittings (hinges, movable mechanisms, etc.); Samples of cutting tools; Structural samples of buildings; Construction samples; Mechanical/moving specimens; Product mock-ups and prototypes.
104a	Knitwear and Textile Laboratory (73.6 m^2)	The laboratory provides an opportunity to prepare fibre material for the production of non-woven or composite material samples; to prepare a warp roller for weaving; to weave both traditional and smart fabrics. Samples for study and graduation projects as well as for research can be produced in the laboratory. Equipment: an automatic micro-shuttle loom, a cutting machine with a mirror frame, a laboratory combing device, a reeling device
CAD/CAM laboratories		
224	Clothing and Textile Products Design CAD/CAM Laboratory (53.5 m^2)	Students are provided with specialized computer-aided design and simulation systems for clothing and textile design and technical calculations, preparation of garment construction, design, template production and grading, layout calculations, production of the cut-out assignment and template placement. (Grafis CAD Software, Lectra, Assyst, Comtense, Pe-design, Koppermann, Tex-Design, computer-aided system SSD for calculation of the working time). Equipment: 16 computer desks, a plotter Canon iP770 for printing out drawings and details.
225	Simulation and Design Laboratory (79.7 m^2)	Students in IDT computer classrooms have access to various types of computer-aided design and simulation systems that provide a high-quality and modern study process – the general application 2D and 3D design, calculation and image processing systems and application software: SketchUp, ArchiCad, SolidWork, Autodesk 3DS Max, AutoCad, Adobe Photoshop, Adobe Illustrator, Adobe Indesign, Adobe Dreamweaver, Comsol Multiphysics, Revit, MatLab, MS Office + MS Visio. Equipment: 20 + 1 computer desks.
Workshops		

105, 106, 107	Wood Technology and Mounting Workshop (375.4 m^2)	The workshop provides both technical and scientific support to students and researchers in the production and research of various wood and composite products (prototypes, mock-ups, bindings). The workshop provides an understanding of medium-scale production processes; it is suitable for the implementation of the final design phase processes – layout, production of the initial sample, as well as for starting the production process. The workshop is suitable for various scientific research, research and production of joints, structures, materials and products. Equipment: Felder: milling machine, format circular saw, band sawing machine, vertical drilling machine, planer-thicknessers longitudinal milling machine, multi-spindle drilling machine, horizontal drilling machine, narrow belt sander, hand edge banding machine, frame edge banding/gluing machines and mounting tables, auxiliary surfaces, scaffolding, Istra-A vacuum press; CNC Step milling, engraving machine; various Festool electric hand tools.	
201	Sewing Workshop (88.9 m^2)	The workshop is suitable for clothing production. Equipment: 9 straight closing jab sewing machines; one 5-thread industrial overlock machine, two 4-thread household overlock machines, 5-thread (3-needle) overlay sewing machine; semi-automatic laundry buttonhole sewing machine; attaching device for snap fasteners, etc. metal elements, two ironing machines with steam generator, adhesive lining fixing machine (press); 8 tables; 1 computer place, whiteboard, water treatment device.	
202, 202a	Fashion Design Workshop (156.8 m^2)	The workshop is suitable for garment development from sketching to ready-made costume collections. The technical provision corresponds to the working environment of production companies. For research purposes, various samples are prepared in the laboratory, which are studied in depth in the Textile Materials Research Laboratory. Equipment: cutting tables; ironing equipment – Batistella 2 pcs; a steam press; a sewing machine Siruba L818D-H1; a sewing machine Juki DU-1181N; a sewing machine Juki DDL-8700B-7; a sewing machine Brother Z-8550A-031; an overlock sewing machine Juki MO-6714S, tailors' mannequins; brackets for placing of products.	
203	Tie-dyeing Workshop (11 m^2)	The workshop is suitable for tie-dyeing and creative processing of textiles. It is equipped with a bathtub, a steamer Uhlig Fixiergerät No.0043 and a microwave oven.	
209	Weaving Workshop (54.4 m^2)	It is possible to produce fabrics of various levels of complexity (including multilayer fabrics), to develop smart textiles. It is possible to create samples for course papers, final theses, and research. Equipment: handlooms (width: 1m; 1.5m; 2m), incl. one loom is equipped with another warp roller – it is possible to weave multilayer fabrics; programmable 24 heald frame loom (width 40cm) – for production of complex weave fabrics.	
210	Knitwear workshop (59.4 m^2)	In the workshop, it is possible to make both traditional and smart knitted fabrics and finished products. It is possible to create complex knitted patterns, develop smart textiles. It is possible to develop samples for studies and final theses, research. Equipment: Class 5 Jacquard knitting machines (8 pcs.), stitch-bonding machine (for knitting joints), sewing machines (incl. overlocker).	

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

III - DESCRIPTION OF THE STUDY PROGRAMME (4. Teaching Staff)

4.1. 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 implementation of the professional Master's study programme "Design Engineering" started in the study year 2020/2021. So far, there have been no changes in the academic staff.

Table 2. Academic staff of the professional study programme "Design Engineering"

2020/2021	Number
Professors	5
Associate professors	8
Assistant professors	8
Lecturers	5
Leading researchers	2
Researchers	1
Assistants	4
	33

In total, 33 academic staff members are involved in the implementation of the study programme "Design Engineering (Table 2). The lecturers responsible for the study courses hold a doctoral degree, as well as 8 of them are experts of the Latvian Council of Science in the field of material science. Choosing the academic staff members is related to their specific education, scientific and practical work experience, taking into account the specifics of the study programme and courses. A practising designer with more than ten (10) years of experience in the field is also involved in the implementation of the study programme.

The study programme is implemented by the academic staff of IDT, still the academic staff of other structural units of RTU is also involved in the implementation of the study programme. Riga Business School (RBS) is responsible for teaching the course "Business Ethics", Faculty of Engineering and Business Management – for the course "Management Psychology" and "Topical Issues in Marketing and Strategic Management", Faculty of E-Learning Technologies and Humanities – for specialized English, German and Latvian language courses. Also, industry experts are invited as visiting lecturers for the implementation of the courses.

4.2. 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.

Qualified academic staff is involved in the implementation of the professional Master's study programme "Design Engineering". Most of the members, or 70%, hold a doctorate degree (23), 8 of them are experts of the Latvian council of Science in Material Science. New employees, doctoral students and applicants for a scientific degree are also involved in the implementation of the study programme (8).

The list of **leading lecturers** of the professional Master's study programme "Design Engineering" and a short description of their qualification is given below.

Silvija Kukle, Dr. habil. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT professor. Professional experience: academic work experience of 47 years in a higher education institution, two years as a production manager, seven years as a member of the board of companies. Scientific activity and research have been carried out since 1976, working as an executor, responsible executor, visiting researcher and project manager, specializing in the development of software-controlled engineering systems, novel textiles modified at nano-level, functional nanofibres and laboratory prototypes of natural fibre-based composite. Has participated in international conferences both with reports and as a member and reviewer of the Scientific Committees of International Conferences. She is an expert of LATSERT and the Latvian Council of Science, the author of more than 200 scientific publications, as well as the scientific supervisor/co-supervisor of 12 successfully defended doctoral theses. In the academic work – conducting courses where students acquire research planning, data processing and interpretation methods, product, and process and consumer research. The study process integrates the latest and current scientific research in the field and its results; current developments are considered in the local and global context.

Edgars Kirilovs, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT Department of Design and Materials Technology, Associate Professor since 2020, Leading Researcher since 2014 and Head of the Department since 2017. Professional experience: more than 10 years of academic experience in a higher education institution, nine years of practical experience in furniture manufacturing and design companies. Scientific activity and research have been carried out for more than 10 years, specializing in the design and engineering of wood products, adapting the aforementioned to the possibilities of modern technologies. The opportunities of the Erasmus + academic staff exchange programme have been used by periodically going to foreign research institutes to exchange experience. Renewable resource boards used for room comfort (acoustics, heat storage capacity) and furniture material structures are researched and developed, as evidenced by participation in international scientific conferences and publications. Competence in materials and technology issues is based on work in both international and national research projects as a project manager and researcher. Expert of the Latvian Council of Science since 2014, in the Wood Materials and Technologies sub-field of the Materials Science field. Membership in the *Furniture Producers Association in Latvia* of Latvian Forest Industry Federation since 2017. The latest and most current scientific research, their results, current events from international industry exhibitions are integrated into the study process at all

levels. The conducted study courses are related to three areas of specialization, such as advanced product design software training 2D and 3-dimensional spatial modelling, parametric 3D modelling), wood products design, technologies and production (Wood products design, Wood products engineering, Wood products and technology, Wood products technology (study project), Upholstered furniture production, Design possibilities of wood, Integrated product design and engineering, Wooden materials processing technologies and creative design), material development, research and integration into products (Master thesis, Internship (design), Fibre materials and product design conceptual models, Special course in research, Scientific seminars in specialization, Scientific work).

Andra Ulme, Dr. arch., RTU, the Faculty of Materials Science and Applied Chemistry IDT associate professor and leading researcher at the Department of Design and Materials Technologies. Member of the working group for the development of the professional Master's study programme "Materials Design and Technology", an expert. Professional work experience since 1987. Academic and scientific work in a higher education institution has been performed since 2004, specializing in interior design, product design, material design and technology. The courses conducted can be divided into three areas of professional competence and are related to design theory (Artistic Composition and Forms, Logic of Colours and Forms, Introduction to Design Theory, User Oriented Design, Design for Change, Design Analysis and Criticism, Design and Branding Strategy), problem solving in interior design and research in ergonomics (Art and functionality of spatial design, Basics of interior design, Interior project management, Design of work processes, Interior architecture) and solving issues of art pedagogy. Work experience is based on more than 45 scientific publications. Competence in design and technology project management and sustainability issues is based on work in several international (Erasmus +) and national (ERDF) research and education projects as a project expert and researcher. Participation in international scientific conferences in the fields of materials science, pedagogy, architecture and construction, including publications and reports on the progress of scientific research. The study process includes the latest findings and the most relevant scientific research in the above mentioned fields, which have been gained by constantly improving her qualification taking courses, taking part in scientific conferences and seminars. Conducting of the course is based on 25 years of experience in managing construction projects in the field of architecture and interior design, arranging international design exhibitions, in internship preparing and training designers in a design company – more than 60 new specialists in 15 years. Scientific activity and research is carried out in the following areas: pedagogy in the field of art and architecture, ergonomics, sustainable environmental development and wood architecture, design and problems and tendencies of interior furnishing. During 16 years, more than 40 Bachelor and 26 Master theses have been successfully supervised and defended, doctoral theses in architecture and urban planning have been reviewed, and one doctoral thesis in materials science has been conducted. Participates in several scientific and practical international projects. Since 2018, participates in international scientific and academic collaboration with the *Southern Federal University Academy of Architecture and Arts, the State Museum-Reserve Sholokhov Rostov Regional Branch of VOOPIK, Union of Architects of Russia.* Within the framework of academic staff mobility, since March 2019, two study courses for architecture students of the Academy's doctoral study programme and one course for Master's students in applied art and design have been systematically conducted in person and later remotely.

Ilze Baltiņa, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT leading researcher at the Department of Clothing and Textile Technologies. Academic and scientific work in higher education institution has been performed since 1989, specializing in clothing and textile technology. Work experience is based on more than 70 scientific publications. The rights of an expert of the Latvian Science Council in the sub-branch of textile and clothing technologies in the field of material science. The conducted courses are related to three areas of specialization, such as

textile production technologies and new product development (Textile Technology Basics, Fabric Structure and Analysis, Weaving Technology, Yarn Design and Technology Basics, Textile Development, Nonwoven Fabric Production, Technological Equipment of Industry Companies, Technical Textiles, Technical textile production, Technical Textile Design And Production, Jacquard Weaving Technology, Advanced Textile Technologies, Textile Technology Theory), textile research, quality properties evaluation (Basics Of Textile And Leather Materials Science, Textile Materials Science, Textile Physics, Quality Assurance, Clothing Materials Development, Product Life Cycle And Quality Management, Textile Research) and Smart Textiles (Smart Textile Development and Research, Innovative Textiles). Regular supervision of elaboration of graduation papers in Master's and Bachelor's professional studies. Under the supervision of I. Baltiņa, a doctoral thesis in materials science has been developed and defended. The knowledge and experience gained in projects and scientific work are integrated in the teaching process. As a leading researcher, she participates in both international (Erasmus +, INTERREG EUROPE) and national research and education projects. She is the Deputy Chairwoman of the RTU Trade Union and the Chairwoman of the IDT Trade union office. Member of the Latvian Council of Experts in the Textile, Clothing, Leather and Leather Products Industries. Member of the scientific editorial board of the 19th International World Scientific Textile Conference Autex 2019, as well as a reviewer of several scientific journals and collections of articles (Cellulose, Journal of Industrial Textiles, Journal of Textiles and Light Industrial Science and Technology). Participated in the preparation of two RTU patents. Participated in the exchange of experience of *Erasmus* academic staff. Regularly participates in professional development and training seminars.

Dana Beļakova, Dr. sc. ing., associate professor. Professional work experience since 1992. Her work at the university began more than 18 years ago, in 2003, performing pedagogical, scientific and administrative work. The conducted courses can be divided into three areas of professional competence and are related to clothing design and production (including clothing design and technology, work study in clothing production companies), design and technology project management and solving sustainability issues. Competence in design and technology project management and sustainability issues is based on work in several international (Erasmus +, Interreg Europe) and national (ERDF, FLPP) research and education projects as a project manager, coordinator and researcher. The research component in working with students is provided by participation in scientific conferences and more than 50 publications in areas of competence. RTU pedagogical qualification upgrading courses and various seminars have been regularly attended, ensuring the knowledge of the latest trends in the field, promoting the acquisition of new pedagogical and professional methods, which allow students to acquire the latest developments related to the industry. The opportunities of the Erasmus + academic staff exchange programme have been taken by periodically going to foreign universities for experience exchange. Participation in the development of modular vocational education programmes and in the development of the digital teaching tool "Manufacture of sewn products". Participation in the work group in the development of the professional standard "Clothing and textile technologist". Director of IDT since 2017 and Head of the Department of Clothing and Textile Technology since 2016. Expert of the Latvian Council of Science since 2010 in the Materials Science sub-branch – Textile and Clothing Technology. Several awards granted by the Prime Minister of the Republic of Latvia have been received for preparing excellent contestants for participation in the European Young Professionals Skills Competition "EuroSkills" in the field of fashion technologies.

Ilze Gudro, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT assistant professor at the Department of Design and Materials Technologies, director of RTU Research Center for Engineering History (RCEH). Academic and scientific work experience in a higher education institution (RTU) since 2011. Scientific work experience is based on 26 scientific publications, one published book, work as a scientific reviewer for a scientific monograph, work as a leading reviewer

for a scientific monograph, seven (7) Bachelor and ten (10) Master thesis have been reviewed, 11 graduation papers have been reviewed. The conducted courses are related to interior design, design analysis and criticism, management of design events, organization and management of various events, the attraction of companies for collaboration organizing practical classes, as well as organizing charity projects with Master's students. Practical experience and creative work since 2008 are manifested in regularly organized exhibitions, where the best works of RTU IDT graduates are exhibited – RTU stand at the International Furniture Exhibition BT1 (since 2008); RTU IDT stand at the exhibition School (since 2010); RTU IDT graduate exhibition "Ķīpsala Design Code" (since 2012); RTU IDT stand at the International Design Exhibition "Design Isle" (since 2013); RTU IDT fashion show "Ķīpsalas pavasaris" (Ķīpsala Spring) (since 2014), creation of RTU History Museum expositions (since 2017). In 2013, I. Gudro started promoting RTU IDT on the social network facebook.com. Ten (10) years of experience have helped I. Gudro to summarize and evaluate, as well as to classify and develop different types of activities to achieve better results. Her main academic interests are the history of RTU, the history and development of Latvian design, engineering, interior, furniture and product design, and materials science.

Inese Ziemele, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry (FMSAC) IDT Associate Professor, Department of Clothing and Textile Technologies. Director of the study programmes WCV0, WDV0 "Clothing and Textile Technology" and the study direction "Manufacture and Processing". Professional experience: more than 20 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, a leading researcher and associate professor. Research areas: sewn products manufacturing technologies, their management and logistics of clothing factories; research on technological solutions, and smart and functional clothing comfort; clothing assortment and quality research. Practical work experience in the position of a company sewn products manufacturing technologist. Research components in work with students are provided by participation in scientific conferences and the development of publications. Periodically attends Erasmus + mobility activities in foreign universities, giving lectures at foreign universities, as well as participating and reporting at scientific conferences. Regularly supervises Bachelor and Master theses. Attended RTU pedagogical qualification upgrading courses. Additional regular participation in various seminars and international exhibitions of the industry, ensuring knowledge of the latest trends in the clothing and textile industry; promotes the acquisition of new methods, which allows students to acquire current developments related to the industry. She is an external member of the Sectoral Expert Council (NEP) (Textiles, Clothing, Leather and Leather Products Industry). Participated in the development of modular educational programmes and examination tasks for professional qualifications. One of the authors of the digital teaching too "Manufacture of sewn products". Regularly participates in international research projects. She has been a member of the jury commission of the National competition for young professionals *SkillsLatvia*.

Uģis Briedis, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT associate professor at the Department of Clothing and Textile Technologies. Professional experience: more than 15 years of pedagogical work, working as a research assistant, lecturer, assistant professor, researcher, a leading researcher and associate professor. M.Eng in Textile Machinery Mechanics. The conducted study courses can be divided into two areas of professional competence and they are related to clothing production technologies and production equipment (their mechanics and operating principles), and sewing factory design (sections, production flow design, production equipment selection and location). Fields of research: research of technological solutions for smart and functional clothing (sub-fields: use of alternative energy sources in smart textiles; use of embroidery technology in prototypes of technical textiles); the latest equipment and technologies for the production of sewn products. Practical work experience in the trade of sewing and embroidery equipment. Participation in scientific conferences and the development of

publications for industry journals ensures the acquisition of the latest technologies and equipment and the research components for academic work. Supervisor of Bachelor and Master theses. Attended RTU pedagogical qualification improvement courses, seminars and international exhibitions of the field, which ensure knowledge of the latest trends in the clothing and textile industry, promote the acquisition of new methods that allow students to learn about the topicalities related to the field. Expert of the Latvian Council of Science in the field of science ”Engineering and Technologies – Materials Science”. Participation in the development of modular educational programmes for professional qualifications. One of the authors of the digital teaching tool “Manufacture of sewn products”. Regular participation in international research projects. Membership in industry associations.

Aleksandrs Okss, Dr. habil. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT associate professor in the field of materials science (Textile and Clothing Technology). Academic and scientific work in the higher education institution has been performed since 1983 specializing in mechanics, and clothing and textile technology. Work experience is based on more than 50 scientific publications. The conducted courses are related to knitting technology (Basics of knitting design and technology), design and application of smart textile products. The latest findings and the most relevant scientific research in the mentioned fields are integrated in the study process.

Zane Zelča, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT assistant professor and leading researcher. Dr. sc. ing. obtained in 2019 in the field of Materials Science in the sub-branch of Wood Materials and Technologies for the research “Expansion of the range of hemp-based composites and optimization of technologies”. In 2014, She won the Werner von Siemens Excellence Award in Science. Academic work experience of 5 years in a higher education institution. The conducted courses can be divided into three areas of professional competence and are related to the use of fibrous materials (Wood Processing Technologies and Creative Design, Conceptual Models of Fibre Materials and Product Design), design and technology project management and sustainability challenges in design and technology, Networking, Planning and Design, Design Marketing, Customer Care) and scientific activities (Research planning and analysis, Scientific research and one Bachelor thesis have been co-supervised. Since 2020, one doctoral thesis is being co-supervised. She has experience in developing e-commerce and marketing projects, an internship in the design company Alfa LogHouses and in the pharmaceutical company Silvanols. Participation in ERDF projects, international scientific conferences, lectures delivered in design-related secondary schools and creative workshops as a guest lecturer. Expert rights of the Latvian Council of Science in the field of materials science since 2020.

Eugenija Strazdiene, PhD, Professor, Faculty of Arts and Creative Technologies, Vilnius University of Applied Sciences (Basics of Clothing Design). She started her professional career in 1984 in Vilnius (Lithuania), in the clothing company “Lelija". In 1987, she started working as a junior researcher at Kaunas University of Technology (KTU), conducting research on computer-aided material laying and cutting systems of Lithuanian clothing companies. In 2000, she defended her doctoral theses “The Investigation and Evaluation of Textile Products Biaxial Deformation Processes” (08T), then started working as an associate professor at the Department of Clothing and Polymer Products Technology, Kaunas University of Technology. During this period she has developed and taught the modules of the Bachelor study courses Fashion Visualization and Modelling and Fashion Engineering, as well as the Master’s study modules Intelligent Clothing Engineering and Digital Clothing Production Technologies. In-service training in France (Haute Alsace University) and Great Britain (University of De Monfort). Since 2008, she has obtained the position of professor, performing pedagogical, project management, expertise and research work. Research directions: mechanical properties of textile and polymer materials; computer aided design

and modelling; 3D scanning and design; sensory evaluation of fibrous materials; smart clothing and textiles. She has conducted 6 doctoral theses and one (1) postdoctoral project, has participated in the doctoral thesis defence committee 16 times, and has been an opponent 4 times. The results of the research have been published in 4 publications in Web of Science database journals without reference index, 79 articles in conference proceedings (Autex, Clotech, FTC, ITMC, the Fibre Society, etc.), 9 articles in periodicals; co-author of The Glossary of Explanatory Clothing Terms (6000 terms in five languages); Co-author of 9 training consultations. Since 2013 she has been a professor at Vilnius University of Applied Sciences. As a guest lecturer in 2014 and 2015 she has been at Tallinn Technical College and in 2019 at RTU. Using ERASMUS mobility opportunities, she has visited RTU, the University of Ljubljana, Helsinki Metropolitan College, Vitebsk University of Technology, Rēzekne Academy of Technology, Lodz Technical University. Has been the manager of international research and study projects. I

Inga Dāboliņa, Dr. sc. ing, RTU, the Faculty of Materials Science and Applied Chemistry IDT associate professor at the Department of Clothing and Textile Technologies, laboratory manager. Participates in the provision of the study process since 2001. In 2010, she obtained a doctoral degree in engineering. The conducted study courses are related to clothing design (Clothing Design and Clothing Design in CAD/CAM system LECTRA). I. Dāboliņa's knowledge and experience are sufficient to achieve the results of these courses. Experience in clothing development 2D and 3D technologies has been gained since 2002. Knows several specialized 2D CAD/CAM systems for clothing design and production (Lectra, Grafis, Comtense, Vidya, Staprim) at the expert level. Since 2007 she has mastered and has gained experience working with a 3D garment fitting system. Performs experimental and practical approbation of 3D scanning system Vitus Smart XXL for study and research purposes, has a good knowledge of 3D body measurement analysis system AnthroScan. From 2016 to 2019, she was the scientific leader and leading researcher in the project "Smart and Safe Work Wear Clothing", one of the main tasks of which was the improvement of functional clothing. The project was implemented very successfully, which proves I. Dāboliņa's knowledge and experience in the field of functional clothing. I. Dāboliņa is involved in the subgroup of "Fit" group of the standardization commission for "IEEE 3D Body Processing". Since 2020, she has been the head of the Research Laboratory of Ergonomic Electrotechnics. Expert of the Latvian Council of Science in the field of science Engineering and Technologies – Materials Science.

Inese Kašurina (previously – Parkova), Dr. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT lecturer at the Department of Clothing and Textile Technologies. Doctor of Engineering Dr.sc.ing., awarded in 2014 for the doctoral thesis "Improvement of Smart Textile Products Design Process". Scientific experience: Author and co-author of 20 scientific research publications, 6 of which are included in recognized databases (Scopus, Web of Science, SciFinder, Ebsco). The results of the research are reflected in the collections of articles of international conferences, scientific journals and other scientific publications recognized by the Latvian Council of Science. Participation in international scientific conferences delivering oral and poster presentations. Registered Latvian patent No. 14680. "Flexible light-emitting textile display designed with floats for covering electronic devices". As a researcher she has participated in international research projects. In 2012, she had an internship at The Swedish School of Textiles of the University of Borås as a visiting researcher working with smart textiles. Academic experience: Since 2019, (she has been)conducting a course for Master's level students "Smart Product Design", as well as conducting a course "Clothing Design" for Bachelor level students. Performs supervision and review of graduation papers in Master's and Bachelor's professional studies. In 2011, she won the Werner von Siemens Excellence Award in Science. In 2010 she was included in the RTU Golden Fund selection. Participated in professional development and training seminars. Member of the Project application evaluation committee of Knowledge and Innovation Community "Manufacturing" (EIT Manufacturing) of the European Institute of Innovation (2019, 2020).

Juris Blūms, Dr. phys. RTU Institute of Technical Physics, Department of Optics, Professor, Leading Researcher, Director of the Institute. Scientific work at the higher education institution has been carried out since 1990 (in the Semiconductor (Physics) Research Laboratory) and since 1993 – a lecturer at the Department of Physics. At the moment he is the author and co-author of more than 80 scientific and methodological works, co-author of several LV patents and patent applications. The rights of an expert of the Latvian Council of Science in the sub-branch of materials (solid-state) physics of the field of physics and astronomy and in the field of engineering science and technology, in the sub-branch of materials science. The courses taught include both general (Introduction to Physics, Physics, Physical Foundations of Modern Technologies, etc.) and specializations (Introduction to Solid State Physics, Solid State Physics, Smart Materials Physics and Electronics, etc.). Under the leadership of J.Blūms, 2 doctoral theses in materials science have been developed and defended at this moment. As a leading researcher, he participates in both international (ERASMUS +, ERDF) and national research (Latvian Science Council grants, state research programmes) and educational projects (ESF, MES projects), their implementation and management. He is the manager of several contract studies and projects. Member of the Promotion Councils of RTU and the University of Latvia. Member of RTU Senate and Faculty of Materials Science and Applied Chemistry Council. Participated in ERASMUS academic staff knowledge sharing. Regularly participates in professional development and training seminars

Aleksandrs Vališevskis, Dr. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry IDT leading researcher. Professional experience: more than 15 years of research work, including more than 10 years in the field of smart textiles, working as a research assistant, researcher and leading researcher. Master's degree in Computer Science. Participates in the management of two study courses: “Development of Smart Products” and “Physics and Electronics of Smart Materials”. Research areas: research of technological solutions for smart and functional clothing (sub-areas: use of alternative energy sources in smart textiles; use of embroidery technology in technical textile prototypes); integration of electronic components in smart textiles. Participation in scientific conferences and the development of publications for industry journals ensures the acquisition of the latest technologies and equipment. Consultant for Bachelor and Master theses as well as for doctoral theses. Participation in the development of modular education programmes. Regular participation in international research projects.

Larisa Iļinska, Dr. philol., RTU Faculty of E-Learning Technologies and Humanities (FELTH) professor at the Institute of Applied Linguistics; Director of the Institute of Applied Linguistics, Head of the Department of Special Use Languages. Academic and scientific work in the higher education institution has been performed since 1993, specializing in linguistics and literary studies, applied linguistics. Work experience is based on more than 55 scientific publications. Expert rights of the Latvian Council of Science in the sub-field of Linguistics and Literary Studies of the field of Humanities and Arts. The conducted study courses are related to English, French, German, Chinese and other languages and technical translation. The latest findings and the most relevant scientific research in the above mentioned fields are integrated in the study process. Regularly supervises graduation papers in professional Bachelor’s and Master’s studies. Has developed a learning and methodological tools. Chairperson of the Scientific Committee of the Scientific Conference “Meaning in Translation: Illusion of Precision”. Regularly participates and reports at international scientific conferences. She is a member of the FELTH Council and the Council of the Institute of Applied Linguistics.

Rita Greitāne, RTU, the Faculty of Engineering Economics and Management (FEEM), Assistant Professor at the Department of Innovation and Business Management. In 2011, she was awarded a doctoral degree in Economics (Dr. oec.) in Management, the sub-field Business Management. More than 20 years of professional experience. Author and co-author of more than 25 scientific

publications in the field of engineering economics and business management. Good organizational skills gained in working with students in organizing and managing student projects. Participation in projects organized by the Latvian Council of Science, RTU and the EU in the field of business and innovative economy.

Jānis Grēviņš, PhD, obtained a doctoral degree in 2002 from the University of Buffalo, USA, in the fields of research: Management Systems (Information Systems Management, Operations Management, Strategy) and Organizational Behavior (Organizational Behavior, Management, Human Resource Management). Since 2003, Director of Riga Business School (RBS) of RTU. Teaches and conducts research on the impact of modern means of communication in project management. Since 2009, Deputy Chairman of the RTU Senate in the work group "Development of Information Technology". Since 2011, a member of the Council of the non-profit education organization Junior Achievement Latvia.

Iveta Ozoliņa-Ozola, a lecturer of a higher education institution in study courses related to Human Resource Management and Economics for more than 20 years; SIA "Safege Baltija" expert and researcher in the field of human resource management, development and economics. Evaluation, research, programme, etc. projects commissioned by the state institutions for more than five years.

Marina Platonova, Dr. philol., Doctor of Philology in Comparative and Contractive Linguistics. RTU, Institute of Applied Linguistics, Professor of the Department of Special Use Languages, the leading researcher at the Faculty of E-learning Technologies and Humanities (FELTH). Author and co-author of several scientific publications, monographs and books; participation in many international conferences, congresses and forums. Member of the editorial board of scientific journals, Head of international conference sections.

Developer and manager of study programmes within the framework of the professional Master's and Bachelor's studies programme "Technical Translation", within the FELTH academic Master's study programme "Digital Humanities" for the RTU Bachelor's, Master's and doctoral students of Engineering Science. The organizer of various research seminars on terminology, semantics, pragmatics and comparative linguistics for the RTU FELTH Institute of Applied Linguistics teachers and students.

Larisa Rozenberga, Mg. paed., Mg. philol., the RTU FELTH lecturer at the Institute of Applied Linguistics. Academic and scientific work in the higher education institution has been performed since 2001, specializing in German. The conducted study courses are related to the German language. The latest findings and the most relevant scientific research in the above mentioned fields are integrated in the study process.

Tatjana Smirnova, Dr. philol. in Linguistics, the sub-branch of comparative and contrastive linguistics. Associate Professor, Researcher in the field of Linguistics and Literary Studies and the Department of Special Use Languages, an expert in the field. Development and administration of education programme. Coordinator of RTU Student Scientific Conference since 2000. Since 2005, Head of the Education Programme Development and Testing Committee and a member of the Council of the RTU Institute of Applied Linguistics. Since 2012, the Acting Chairman of the Department of Target Language, RTU Applied Linguistics. Head of the Methodological Commission of RTU Institute of Applied Linguistics. Work with assistant professors of the Department of Special Use Languages for upgrading the qualification level (organization of guest lectures, organization of methodological seminars, participation in conferences, etc.). Council member of the Faculty of E-Learning Technology and Humanities (FELTH), the FELTH Council secretary. Author of more than 40 scientific publications.

Šatrevičs Vladimirs, Doctor's degree obtained in 2016. RTU assistant professor in the field of Economics and Entrepreneurship (Business Management) and at the Department of Innovation and Business Management. Expert in the field of Economics and Entrepreneurship of the Latvian Science Council, Higher Education Quality Agency (AIKA) and European Union EASME (Belgium). Participation in international projects as a researcher (No. NFI/R/2014/006 "EU policies impact to the transformations of the higher education and research system in Norway and Latvia"; "Economic Transformation, Smart Growth, Governance and Legal Framework for the State and Society for Sustainable Development – a New Approach to the Creation of a Sustainable Learning Community"). Scientific journal "Int. J. of Economics and Business Research" and "Business and Management" reviewer. Author and co-author of more than 40 scientific publications.

Gaļina Terļecka, Dr. sc. ing., assistant professor, lecturer, expert. Academic and scientific work in the higher education institution has been performed since 2007, specializing in Clothing and Textile Technology. Work experience is based on 17 scientific publications. The conducted study courses are related to clothing design, technology, and sizing. The latest references and the most current scientific research in the mentioned fields have been used in the study process. As a researcher and expert, she has participated in several international and national research projects. Participated in professional development and training seminars. Participated in the development of modular professional education programmes "Professional Qualifications in the Textile, Clothing, Leather and Leather Products Industry" and in the development of the professional qualification exam programme of the module "Block Pattern Grading".

Andrejs Broks, Mg. art., RTU Faculty of Materials Science and Applied Chemistry IDT practical assistant professor at the Department of Design and Materials Technologies. Professional activity at the higher education institution since 2017, in the sub-field Wooden Materials and Technologies of the field of Materials Science. Since 2019, he is an expert in Vocational Education Quality Assessment in Vocational Education Institutions of the National Centre for Education. Professional activities are related to interior design, design of exhibition stands and other design products, and development and management design projects. Manager of the company "Dizains videi" (Environment Design) and designer. He is the author of many interior design projects for public buildings. Active work in public organizations, involvement in the development of design strategies and cultural policy. He has been Chairman of the Board of the Latvian Designers' Association (2012–2018), representing the association in industry-related public administration institutions, expert councils, leading the association's professional qualification certification commission, organizing professional competitions and exhibitions, as well as organizing the association's social life. He is a member of the Board of the Council of the Creative Unions of Latvia, a member of the Latvian Design Council under the Ministry of Culture of the Republic of Latvia, as well as a member of the Cultural Education Council. Participated in the development of the design structure of the design industry, product and environmental design education standards, an expert of the Arts sector Design and Creative Industries of the National Centre for Education, a member of the Cultural Education Council of the Latvian National Centre for Culture under the Ministry of Culture; A member of the Riga City Council Monuments Council, chairman of the Riga Art and Media Technical School Convent, has been a member of the industry experts council (Construction). Developed the concept and design of the Latvian Designers' Association competition (LDS) "Design Award" and managed the project (2002–2017). Has developed and conducted study courses related to design and branding strategies, design and technology project management, wood product composition and interior design.

New academic staff and scientists of IDT are also involved in the implementation of the study programme, whose activities and research areas are related to technologies, design and design of smart materials, in accordance with the specifics of the study courses.

Baiba Lukaševiča, Mg. sc. ing., RTU Faculty of Materials Science and Applied Chemistry IDT lecturer and research assistant. Academic work experience in a higher education institution since 2015, assisting and running study course lectures and practical work, as well as developing study course materials. Since 2017, more than 14 graduation papers have been supervised and co-supervised. In the guided courses, students learn the process of developing new product designs and designing industrial product collections (Wood product design, Industrial collection planning, Innovative product development and business, Integrated product design), 3D modelling and computer-aided design methods (Parametric 3D modelling, Automated design) as well as the Basic Principles of Sustainable Design (Design and Technology for Sustainable Development). The study process integrates a project-based learning approach, user-oriented design and creative thinking methods. The involvement of students in extracurricular projects and competitions is encouraged. Research interests are related to design education, theoretical aspects of the design development process, the specifics of teamwork and integration of sustainability issues into product design. Attends events, seminars, conferences and refresher courses related to the design and education sector for professional development. Practical experience in interior design and product design is complemented by participation in creative workshops (*Garage 48, Geniator XL*), involvement in IDT events and implementation of other projects. In parallel with the work with Bachelor's and Master's level students, actively participates in the preparation of and conducting classes for school students interest-related education in design and innovations implemented by RTU.

Artūrs Ķīsis, Mg .sc. ing., lecturer at RTU Faculty of Materials Science and Applied Chemistry IDT Department of Design and Materials Technologies and researcher in the Materials Science sub-field Wood Materials and Technologies. Five year professional experience in the higher education institution. Scientific and research work was performed specializing in functional design prototypes, 3D modelling of samples, simulations on CAD/CAM platforms, designing and producing prototype models from wood, wood composites, acrylates, plastics, artificial minerals and "soft" metal base materials, fittings and adhesives/finishing materials evidenced by participation in international exhibitions and scientific publications. Active practical experience of 16 years in prototype development in the wood and furniture industry. He is a member of the Latvian Wood Industry Expert Council and a member of the Latvian Furniture Exporters Association. In co-operation with the National Centre for Education, he has led seminars on practical activities "Application of hand-held electric cutting tools in the manufacture of wooden products". From 2016 to 2018, he was the author of the competition tasks developed for the woodworking industry and the nomination manager of the national skills competition for young professionals "*Skills Latvia*". In the academic work, students acquire the potentialities of using CAD/CAM platform, materials and technology, and skills in design product prototype development.

Ilze Gūtmane, Mg. sc. ing. RTU, the Faculty of Materials Science and Applied Chemistry (FMSAC) IDT assistant and research assistant. Professional experience: since 2016 works at IDT, leading and assisting study courses Introduction to the field of study, Traineeship, Creative Works for Bachelors, Design of Wood Products, Design for Change. Supervised and co-supervised nine and peer reviewed five Bachelor theses. Professional activities are mainly related to product design, layout, product manufacturing and design thinking process. Scientific activity and research is based on the study of woodworking hand tools, their systematization and grouping at the level of main groups and subgroups. The performed research is reflected in scientific publications. Active participation in various events and seminars related to the design and woodworking industry. Involvement in IDT events, creative workshops, exhibitions, excursions, etc. organizing and managing events. The RTU FMSAC IDT social network administration.

Ilze Balgale, Mg. sc. ing., Mg. sc. soc., RTU, the Faculty of Materials Science and Applied Chemistry IDT assistant and research assistant at the Department of Clothing and Textile Technologies.

Academic and scientific work experience in the higher education institution since 2019, specializing in clothing and textile technology. Doctoral studies in the doctoral study programme “Clothing and Textile Technologies” since 2020, research direction – textile sensors. Since 2019, participation in international scientific conferences and preparation of scientific publications. Master’s degree in Communication Science and professional work experience since 1999, ensured the possibility to conduct study courses related to two areas of specialization: textile technologies – yarn, fabric, knitted, non-woven fabric manufacturing technologies and equipment, textile business planning, and technical and intelligent textile development, as well as in the field of commodity science and marketing. The latest research is integrated in the conducted study courses.

Ieva Baķe, Mg. sc. ing. RTU, the Faculty of Materials Science and Applied Chemistry IDT research assistant and teaching assistant, doctoral student. Professional experience in the higher education institution since 2019, leading and assisting the study courses Materials Research Methodology and Customer Care. Assists in the laboratory and practical work related to materials research and testing. Peer reviewed Bachelor theses. Scientific activity and research is based on the modification of mixed fibre textiles with sol-gel technique. The performed research is reflected in scientific publications. Participation in various industry-related events. Involvement in the organization of IDT events and exhibitions.

Eva Lapkovska, Mg. sc. ing., RTU researcher. Academic work experience in a higher education institution (RTU) since 2016, specializing in materials science, textile and clothing technology. Participation in conducting study courses – assisting the professor in lectures, supervising laboratory work and participation in the improvement of lecture materials and laboratory work of the study courses on The Anthropology of Apparel Science and Computer-aided Clothing Design Methods. Research interests include research in anthropometry for use in apparel design processes and sizing analysis, garment construction methods, functional garment design, human body 3D scanning, application of computerized (2D and 3D) design systems in garment design and research. Development of publications within the research (more than 20) and participation in local and international conferences. Participation in national and international projects (INTERREG, ERASMUS +), cooperation with companies and state institutions.

Liene Siliņa, Mg. sc. ing., RTU, the Faculty of Materials Science and Applied Chemistry research assistant. Professional experience: more than 2 years of academic experience in a higher education institution. Scientific activity and research have been carried out for more than 4 years, specializing in automated clothing design, sizing of clothing and comfort research, smart textiles, clothing and textile sustainability issues proved by participation in scientific projects and research programmes, participation in international scientific conferences and publications. Students acquire automated clothing design systems and basic principles, develop and present practical tasks.

The qualification of the academic staff involved in the implementation of the study programme ensures the achievement of the results of the study programme.

The qualification of the academic and scientific staff members involved in the implementation of the study programme complies with the requirements set forth in the regulatory enactments regarding the assessment of the scientific and pedagogical qualification of the job applicant.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the 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 may be

additionally specified (if applicable).

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).

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

The academic staff involved in the implementation of the study programme works in scientific research, which is evidenced by the scientific publications of the academic staff (Annex 8). Faculty members regularly attend local and international scientific conferences, where they obtain the latest information on current events in the field, which is passed on to students through study courses, seminars and discussions. IDT regularly implements both scientific and study projects in such programmes as FLPP, ESF, ERDF, *Erasmus* + and INTERREG, in the implementation of which most of the academic staff participating in the implementation of the study programme is involved. Master's level students are also involved in the implementation of projects. In addition, IDT lecturers are active in performing both scientific and study-related contract work collaborating with various companies in the field. IDT lecturers regularly visit foreign universities with guest lectures. IDT academic staff has the opportunity to develop professionally and gain valuable experience in foreign universities through Erasmus + or project mobility opportunities, which are in line with the strategy for the development of the European Higher Education Area. The experience gained is integrated into the study process both by supplementing lecture materials, using new methods in research, and discussing the experience with students. Most often, new findings are integrated into Master`s theses.

Examples include two Erasmus + projects – Circular Economy Innovative Skills in the Textile Sector (3481/2017/2017-1-ESO1-KA202-038419) and "Innovative Design Practices for achieving a New Circular Textile Sector", Manager: assoc. professor D. Beļakova. The project focused on addressing sustainability issues in the textile industry. The content developed in both projects has been almost fully integrated into the study courses *"Design and Technologies for Sustainable Development"* and *"User-Oriented Design".* The involved academic staff: D.Beļakova, A.Ulme, I.Ziemele, G.Terļecka, I.Baltiņa, etc.

Furthermore, the results of the European Social Fund project, programme "Human Resources and Employment", Activity 1.1.1.2 "Attracting human resources to science" "Development of innovative technologies for maintaining and production of heat and cold" 2013/0064 / 1DP / 1.1.1.2.0 / 13/APIA/VIAA/050 are integrated in the study course "Integrated product design and development".

The project has been implemented in cooperation with the Institute of Physical Energetics and the Agency of the “Scientific Institute of Agricultural Machinery” of the Latvian University of Agriculture (Latvia University of Life Sciences and Technologies). The research was carried out in two directions – improvement and adaptation of solar energy cooling system technology to conditions in Latvia and development of hemp mixture board raw material production technology. D.Beļakova, Z.Zelča, S.Kukle, E.Kirilovs, I.Baltiņa, etc.

Also, the Operational programme “Growth and Employment” 1.1.1. Specific support target “Improve the research and innovation capacity of Latvian research institutions and the ability to attract external funding by investing in human resources and infrastructure” 1.1.1.1. Measure “Practical Research” in the project *“Synthesis of textile surface coating modified in nano-level and energetically independent measurement system integration in smart clothing with functions of medical monitoring”* (2588/2017/1.1.1.1/16/A/020), supervised by Professor S. Kukle. The results are integrated into the study courses *“21st Century Challenges in Design and Technology”*, *“Research Design and Analysis”*, *“Smart Materials Physics and Electronics”*. The project objective was to gain more knowledge and understanding of smart clothing elements, such as textiles, energy independent systems and the development and improvement of a measurement system based on textile sensors, as well as the application and integration of these elements in a set of smart garments for medical monitoring in the field of orthopaedics. During the project implementation, a Master thesis was developed on the project topic (I. Baķe). The involved lecturers: D. Beļakova, U.Briedis, I.Ziemele, I.Baltiņa, Z.Zelča, A.Okss, etc.

Project 1.1.1.2. “Support for Postdoctoral Research” "Structures and technology development of smart insulation materials for indoor microclimate regulation" (3284/1.1.1.2/VIAA/1/16/1520), supervised by Professor S.Kukle and post-doctoral student/implementer E.Kirilov. The results are integrated into several Master thesis topics and the study course “Integrated Product Design and Design”. The aim of the project was to develop a green building-intelligent self-supporting thermal insulation material for latent heat storage/return with improved sound insulation properties, using environmentally friendly components and biotechnologies that will ensure effective indoor microclimate regulation, reduce heating/ventilation costs and study the structure effect on thermal insulation parameters and approbate its manufacturing technology.

The results of INTERREG, European Union Structural Funds Objective 3 of “European Territorial Cooperation” programme international research project No. R006 “Smart and Safe Work Wear Clothing” were integrated into the study courses *“Development of Smart Products”*, *“Technological Systems and Supply Chains Management and Logistic*", *“Product Life Cycle and Quality Management”*, *“Clothing Design 2D and 3D Technologies”*. Project implementation period from 01.03.2016 until 01.03.2019. The Latvian partner of the scientific leader of the project was IDT associate professor, leading researcher Dr. sc. ing. I. Dāboliņa. The project involved groups of researchers from universities and entrepreneurs in five Baltic countries: Centria University of Applied Sciences Ltd. (Finland’s leading partner), Poland, Lithuania, Estonia and Latvia. The project focused on customizing production orders and integrating IT technologies into workwear, as well as improving the supply chain management, to develop a smart workwear manufacturing business in the Baltic Sea Region (BSR). The involved academic staff: I Dāboliņa, D.Beļakova, A.Viļumsone, E.Strazdiene, L.Siliņa, E.Lapkovska, etc.

Also, as an example, the experience gained in project implementation and management is integrated into the study course *“Design and Technology Project Management”*.

The professional Master’s study programme “Design Engineering” is new and has no defended Master`s thesis yet, however, the best traditions that had become established in the currently closed programmes "Material Design and Technology" and "Clothing and Textile Technology" are

transferred to the new study programme. Within the framework of these study programmes in the reporting period, research has been carried out in Master`s theses in accordance with the scientific directions of IDT, and the topics of Master`s theses reflect the scientific activity of the academic staff. Practically all Master`s theses defended at IDT in the reporting period were based on a broader or narrower scope of research in areas where the structural unit has experience and competencies, infrastructure and cooperation partners.

Promoting the professional growth and academic excellence of RTU employees, IDT lecturers and scientists participate in international projects of various levels and carry out research commissioned by local businesses.

4.6. 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 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).

In order to achieve the results of the study programme, the mutual link between the study courses and their sequential and logical acquisition are of great importance. In order to promote collaboration among the academic staff members of RTU, a system has been created that provides regular academic conferences and professional development seminars for the improvement of methodological teaching competencies. Examples include the April 27, 2018 academic conference “Integration of Methodological and Scientific Work in the Study Process”. Such measures promote the improvement of the academic staff’s skills and provide an opportunity to collaborate more effectively to achieve results and improve study courses.

The professional Master’s study programme “Design Engineering” is based on project-oriented education, which envisages the development of a study project every semester. The study project is implemented in collaboration with the academic staff of all study courses involved in the respective semester. Each part of the study project is related to a certain study course. To advance the project, several meetings between students and lecturers are organized every semester to discuss both the implementation of the study project and the study process in general, thus ensuring collaboration between both lecturers and students, targeted at a common goal. During the meetings, the students present the developed parts of the project; the academic staff members give recommendations for the improvement of the work. When discussing the progress and quality of the work, proposals are made for the desired changes in the study programme or individual study courses.

At each semester meeting, the implementation of the study program, the course of the study process and the achieved results are evaluated. Questionnaires filled out by students about the quality of the implementation of study courses are of great importance in this process. Based on the analysis of the current situation, solutions are found jointly. For example, adjustments have been made in the structure of individual study courses in order to avoid partial overlapping and improve the interconnection of study courses, or changes in the content of the study programme have been proposed. In this case, the proposals are evaluated by the commission of the study field “Production and Processing”, a decision is made and submitted to the Faculty Council for consideration.

The ratio of the number of students and lecturers within the professional Master’s study programme

“Design Engineering” as of January 31, 2021 is 1 : 3. Such a ratio promotes good individual student-faculty contact, thus enabling effective study work. However, in reality, this ratio is higher, because it should be taken into account that the academic staff does not work with only one specific study programme.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	1_pielikums_Studejoso_statistika_Annex_1_Statistics_on_students_master.pdf	1_pielikums_Studejoso_statistika_Annex_1_Statistics_on_students_master.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	Annex_2_Compilance_with_State_Educational_Standard.pdf	2_pielikums_ATBILSTIBA_STANDARTAM.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (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	3_Annex_Mapping_of_study_programme.pdf	3_pielikums_Studiju_programmas_kartejums.pdf
Curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex_4_PLANNING_OF_STUDY_PROGRAMME.pdf	4_pielikums_STUDIJU_PROGRAMMAS_PLANOJUMS_LV.pdf
Descriptions of the study courses/ modules	Annex_5_Study_courses.zip	5_pielikums_Studiju_kursi.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	Diploms_un_pielikums_Diploma_and_supplement.zip	Diploms_un_pielikums_Diploma_and_supplement.zip
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Vienosanas_ar_LLU_01000-4.1-e_53.edoc	Vienosanas_ar_LLU_01000-4.1-e_53.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	Par_zaudējumu_kompensāciju.edoc	Par_zaudējumu_kompensāciju.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.	02000-2.2.1-e_97 - svešvalodu prasme.edoc	02000-2.2.1-e_97 - svešvalodu prasme.edoc
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education		
Sample (or samples) of the study agreement	Sample_of_study_agreements.zip	Studiju_liguma_paraugi.zip
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.		